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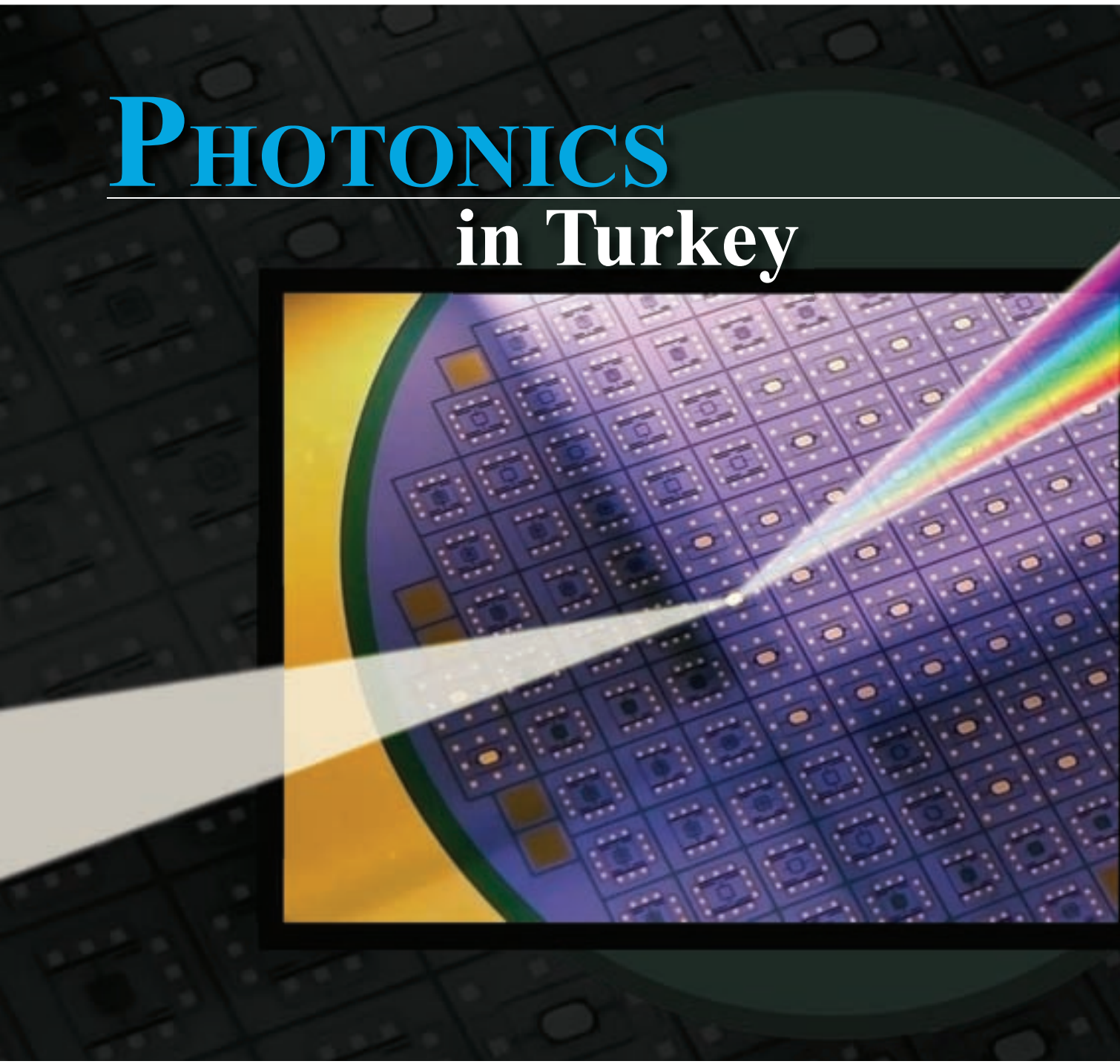

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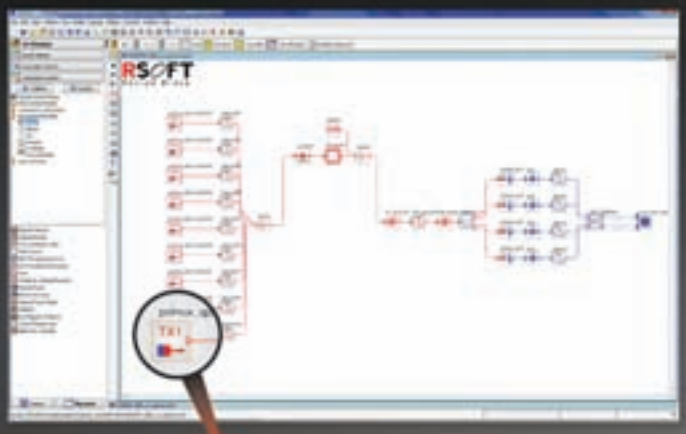

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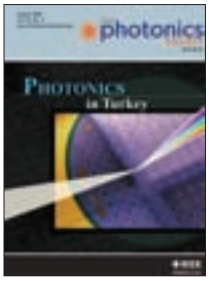

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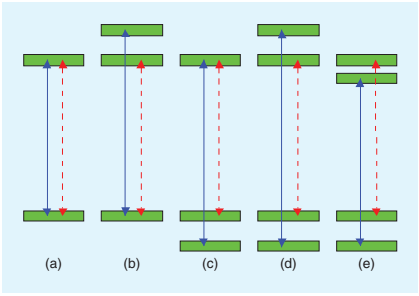
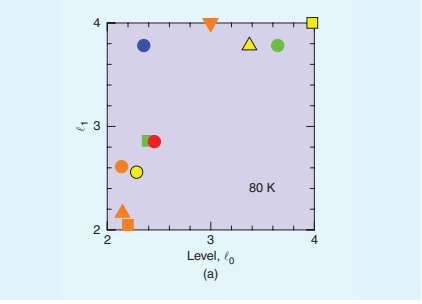
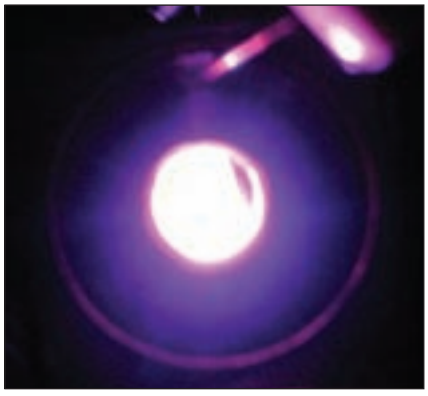
FEATURES







DEPARTMENTS

COLUMNS

Editor's Column

KRISHNAN PARAMESWARAN

Welcome to the August Photonics Society Newsletter! This month, Dr. Jeffrey White from the United States Army Research Laboratory has written a nice article about low quantum-defect solid-state lasers. This overview should be particularly useful for those of you looking to work in this important field. We also have a preview of the 2009 Photonics Society Annual Meeting that will take place in Belek-Antalya, Turkey in October. Program Chair Prof. Roel Baets has provided a list of highlights. I hope that many of you can attend the flagship conference of our Society. As a nice complement to the conference preview, we have Chapter Highlights article from the Turkey Chapter presented by Professors Hakan Urey, Alper Kiraz, and Hilmi Volkan Demir. As we had a few typos in the Journal descriptions in the June issue, we have included the corrected overviews in this issue.

I hope that you all received e-mails with the Newsletter Reader Survey. Please reply with your responses if you have not already done so, as your opinions and thoughts are very important to us.

As always, please send any comments and suggestions to k.parameswaran@ieee.org.

Regards,
Krishnan Parameswaran

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President's Column

JOHN H. MARSH

Since my last column, the Board of Governors met at CLEO and IEEE held its management meeting series in Los Angles, both in June. The major topic in both cases was the current economic climate and its effect on the financial performance of the Society and the Institute. As I will describe below, the Society's financial fortunes are inextricably linked with those of the Institute as a whole, and the major challenge currently facing us is building a viable budget for next year that maintains a high level of member services.

A Snapshot of the Current Finances…

It appears inevitable that the Society will make a loss this year. Revenue from conferences is down – indeed across IEEE as a whole, conference registrations are down on average by 20%, an inevitable result of companies cutting travel expenditure. The academic environment, at this stage, is holding up somewhat better, for example CLEO experienced a much lower than average drop in technical attendance. In the last month the drop across IEEE conferences has grown by a further 5% to 25%, largely as a result of concerns about the H1N1 'swine flu' virus. However, the situation is not as bleak as conference registrations would suggest. Taken across the all societies within IEEE, there are significant drops in conference and membership revenue, but these are being largely (though not completely) compensated by operational savings and by increased revenue from sales of publications.

We do not have a direct view of how much the increased sales of publications will benefit the Photonics Society. Publications revenue is distributed by a number of complex algorithms that mix historical features together with more tangible metrics, such as the number of downloads of our own publications and conference proceedings. The total income from publications is dominated by the sales of the 'IEEE/IET Electronic Library' (IEL) package to major institutions. IEL effectively allows unlimited downloads within subscribing institutions for a fixed charge. The distribution of income to societies is partly driven by which papers are accessed, so the effect of the algorithms is that societies are competing with each other for a slice of a fixed sum of money. [The sales of individual downloads are relatively small in this mix, as are direct sales of paper copies of journals to members.]

(continued on page 18)

Low-Quantum-Defect Solid State Lasers: 2-, 3-, or 4-level?

Jeffrey O. White

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The concept of three-level- and four-level-lasers was used early on to explain why it was easier to make the Nd^{3+} ion lase than the Cr^{2+} ion. Almost 50 years later, work on solid-state lasers has recently led to a quantitative definition of the concept. The new level parameters ℓ_0 and ℓ_1 defined below will provide an improved basis for comparing Nd^{3+}, Cr^{2+}, and other ions, e.g. Er^{3+}, Yb^{3+}, Ho^{3+}, and Tm^{3+}. Together with the cross section, lifetime, etc., they help in the design of a laser by providing a basis for choosing the operating temperature, pump wavelength, and laser wavelength.

The original distinction between three- and four-level-lasers addressed only the separation between the ground state and the lower laser level [1]. The terminology suffices if the levels are either well-separated or well-overlapped with respect to k_BT. The separation between the emitting levels was not an issue initially, because the upper pump levels were far above the upper laser level. This was because early solid-state lasers were pumped with arc lamps whose output spanned the visible spectrum. Most of the excess energy remained as heat, however, which resulted in thermal stresses and optical inhomogeneities. Now, the availability of high power diode lasers has made it possible to pump levels that are not so far above the upper laser level, and that relax to the upper laser level with high efficiency.

Even with today's more efficient diode laser pumping, however, the excess photon energy remains an issue. The recent development of high average power, high brightness solid-state-lasers has had to address this heat load (see sidebar). The 105 kW laser recently demonstrated by Northrop Grumman [2,3] uses a slab geometry to favor heat removal and minimize deleterious thermal gradients, and incorporates adaptive optics to compensate the residual aberrations and achieve a beam quality of three [4,5]. Efficient removal of heat due to a high surface to volume ratio has helped IPG Photonics develop the world's first 10 kW single-mode production fiber laser [6].

Another approach to minimizing the heat load is low-quantum-defect [7] pumping, where the separation between absorbing states should be as small as practical, and likewise for the emitting states. However, the search for systems with a low quantum defect inevitably leads from the ideal case of a four-level-system, down to a two-level system, unless the temperature drops accordingly. What are the implications for laser design? In a 2-level system (Fig. 1a), unless the upper energy level has a higher degeneracy, there can be no inversion in steady state, and thus no gain. In a 3-level laser where the ground state is shared, as in the case of 694.3 nm emission from ruby, ground state absorption (GSA) at the laser wavelength implies a higher laser threshold (Fig. 1b). If the emitting levels are too close, electrons can be thermally excited from the upper laser level to the upper pump level, reducing the gain at λ_L and the absorption at λ_P. When the excited state is shared (Fig. 1c), one can expect to encounter saturation of the pump absorption. If the absorbing levels are too close, ions can be thermally excited from the ground state to the lower laser level, again reducing the gain at λ_L and the absorption at λ_P.

In an ideal 4-level laser, these issues are absent (Fig. 3d), but real lasers fall somewhere in between 2-level and 4-level, because the separation between absorbing levels is comparable to k_BT, or the separation between emitting levels is comparable to k_BT, or because the level alignments are sub-optimal (Fig. 3e).

Extraneous levels also play a role in all of the above cases because they indirectly modify the absorption at λ_P and the gain at λ_L. If an energy level is added in the middle of the absorbing states, it helps to depopulate the lower laser level, which increases the gain at λ_L, but it also depopulates the lower pump level, which reduces the absorption at λ_P. Similar issues arise when extraneous levels appear around the emitting levels.

The quasi-level terminology has arisen to describe intermediate situations that are unclear because of a combination of several levels that are directly involved in the optical transitions, extraneous levels that become populated but that are only indirectly involved, and multiple level spacings, some comparable to k_BT. In the last 10 years, there have been 280 papers that have used the terminology quasi-2 level, quasi-3, and quasi-4 in the title or abstract alone [8]. The interest in low-quantum-defect lasers has forced the issue of finding a figure of merit for a system of energy levels that (a) can compare 2-, 3-, and 4-level systems and everything in between, (b) is closely tied to physical quantities like gain, (c) is based on the level occupancies, taking into account thermal population of the lower laser level *and* of the upper pump level, and (d) helps to choose λ_L, λ_P, and the operating temperature. A well-defined figure of merit, e.g. a level scale that varies continuously between two and four, would be a useful intuitive guide to have in mind when thinking about a laser. Can all of that be accomplished with one figure of merit? I believe that it can be done with two closely related figures of merit, called level parameters, derived below.

Using Er:YAG as an example, the $^4I_{15/2}$ angular momentum state is split by the crystal field into a manifold of eight sublevels; the $^4I_{13/2}$ is split into seven (Fig. 2). To reduce the quantum defect, one can pump *and* lase between the lowest two manifolds. Referring to Fig. 2, f_{eL} is the probability that an electron

is in a state that can emit a Laser photon, given that it's in one of the emitting levels. f_{aP} is the probability that an electron is in a state that can absorb a Pump photon, given that it's in one of the absorbing levels, etc. The optimum case would be where $f_{aP} = f_{eL} = 1$, and $f_{aL} = f_{eP} = 0$, however, the splittings are too small for that to be true at 300 K.

Consider a laser beam and a pump beam propagating through a medium e.g. Er:YAG, at temperature T, characterized by cross sections at λ_P and λ_L. The rate equation for the population density of the absorbing states, N_1, includes the conventional terms for absorption at λ_P, and emission at λ_L. To these, we add terms for emission at λ_P and absorption at λ_L.

$$\begin{aligned}\frac{dN_1}{dt} &= +\Phi_P\sigma_P(f_{eP}N_2 - f_{aP}N_1) \\ &\quad +\Phi_L\sigma_L(f_{eL}N_2 - f_{aL}N_1) + N_2W_{21} \\ \frac{dN_2}{dt} &= -\frac{dN_1}{dt}\end{aligned} \tag{1}$$

$\Phi_P(\Phi_L)$ is the pump (laser) photon fluence, $\sigma_P(\sigma_L)$ is the cross section at $\lambda_P(\lambda_L)$. W_{21} is the relaxation rate from the emitting states N_2 to N_1, typically equal to the spontaneous emission rate. The propagation equations show gain for $\Phi_L(\Phi_P)$ to the extent that the upper laser (pump) level is occupied, and loss to the extent that the lower laser (pump) level is occupied.

$$\begin{aligned}\frac{d\Phi_L}{dz} &= \sigma_L(f_{eL}N_2 - f_{aL}N_1)\,\Phi_L \\ \frac{d\Phi_P}{dz} &= \sigma_P(f_{eP}N_2 - f_{aP}N_1)\,\Phi_P\end{aligned} \tag{2}$$

Eqns. (1) can be easily solved for N_1 and N_2 in steady state, and inserted into (2). By neglecting spontaneous emission, and considering the case that $\Phi_L\sigma_L(f_{aL} + f_{eL}) \ll \Phi_P\sigma_P(f_{eP} + f_{aP})$ (transitions at λ_P much faster than transitions at λ_L), which we can call the small signal regime, the propagation equation simplifies to

$$\frac{d\Phi_L}{dz} = \sigma_L N_{tot} f_0 \Phi_L, \qquad \text{where } f_0 \equiv \frac{f_{eL}f_{aP} - f_{aL}f_{eP}}{f_{aP} + f_{eP}}. \tag{3}$$

N_{tot} is the sum of N_1 and N_2. The exponential gain coefficient for Φ_L clearly has a factor involving level occupancies alone.

In the large signal regime, the transitions at λ_L are much faster than λ_P, which could obtain inside a laser cavity. In this case, the pump fluence decreases exponentially, and the laser fluence increases asymptotically according to

$$\frac{d\Phi_L}{dz} = \sigma_P N_{tot} f_1 \Phi_P, \quad \text{where } f_1 \equiv \frac{f_{eL}f_{aP} - f_{aL}f_{eP}}{f_{eL} + f_{aL}}. \tag{4}$$

The coefficient that couples Φ_P and Φ_L clearly has a factor involving level occupancies alone.

Eqns. (3) and (4) suggest the following definitions for level parameters ℓ_0 and ℓ_1.

$$\ell_0 = 2(f_0 + 1) \qquad \ell_1 = 2(f_1 + 1) \tag{5}$$

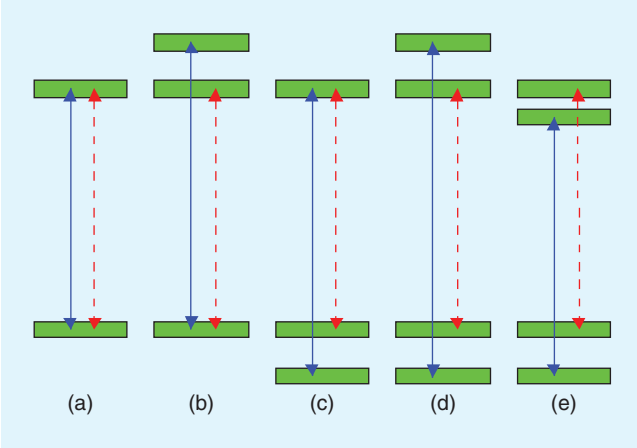


Figure 1. Different possibilities for two-, three-, and four-level lasers, showing pump (solid) and laser (dashed) transitions.

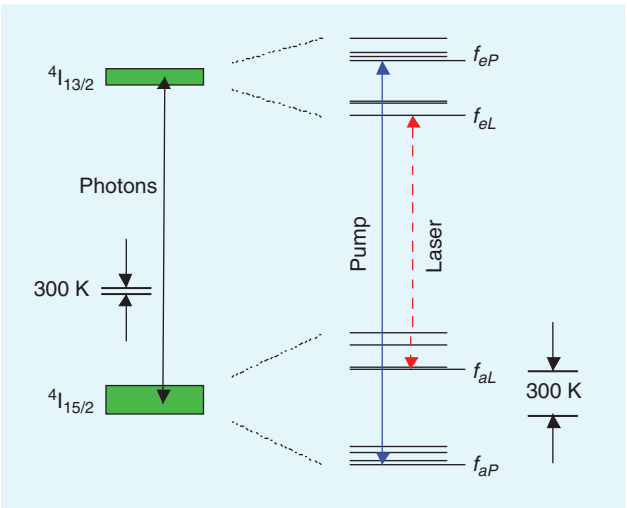


Figure 2. Er^{3+} ground state manifold and first excited state manifold. The scale on the right is magnified.

The level parameters are so-named because in the optimum 4-level case, $\ell_0 = \ell_1 = 4$. In the optimum 3-level case, $\ell_0 = \ell_1 = 3$, and in the 2-level case, $\ell_0 = \ell_1 = 2$. Other things being equal, in the small signal (amplifier) regime, a system with $\ell_0 = 4$ will have twice the gain of a system with $\ell_0 = 3$. In the large signal (laser) regime, a system with $\ell_1 = 4$ will have twice the coupling coefficient of a system with $\ell_1 = 3$.

Given the electronic energy levels of Er:YAG, and assuming a Boltzmann distribution in the absorbing states and the emitting states, one can easily calculate ℓ_0 and ℓ_1 as a function of temperature. For $\lambda_P = 1470$ nm and $\lambda_L = 1645$ nm, there is an 11% quantum defect and the system behaves like a 2.46-level laser at 300 K (Fig. 3). At high temperature, ℓ_1 approaches two, as one would expect. At low temperature, ℓ_1 increases to four. ℓ_0, however, reaches an optimum at 130 K, and then goes to zero because the upper laser level is not the lowest in its manifold, and freezes out at low temperature. Of course, the absorption and emission cross sections will also change with temperature. However, other things being equal, 130 K would be the optimum temperature for an Er:YAG amplifier operating at these wavelengths.

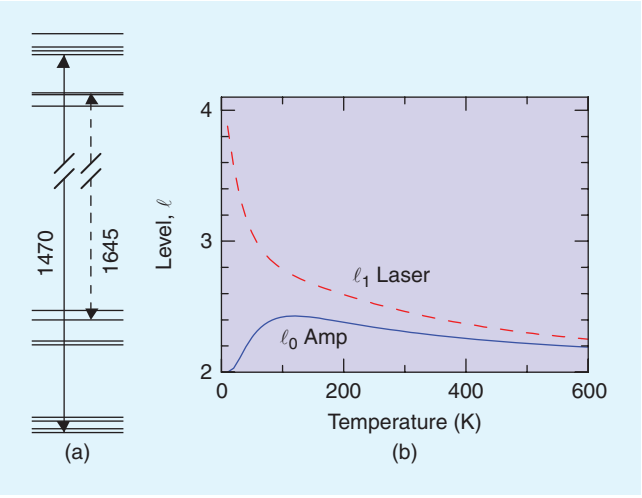


Figure 3. Er:YAG, λ_P = 1470 nm, λ_L = 1645 nm: (a) energy levels, pump transition (solid line), and laser transition (dashed line), (b) temperature dependence of the level parameters.

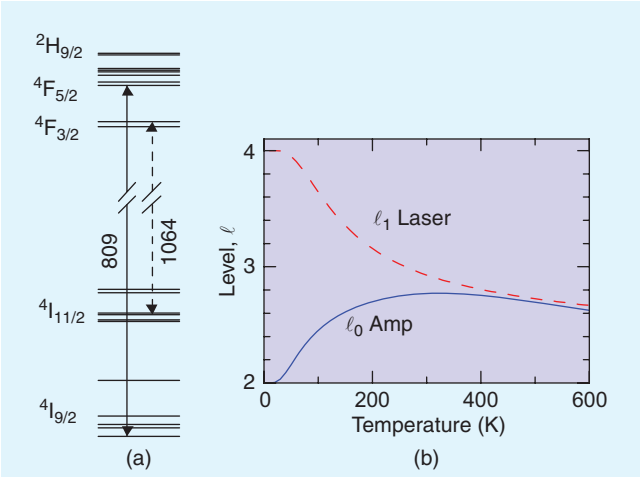


Figure 5. Nd:YAG, λ_P = 809 nm, λ_L = 1064.1 nm: (a) energy levels, pump and laser transitions, (b) temperature dependence of the level parameters.

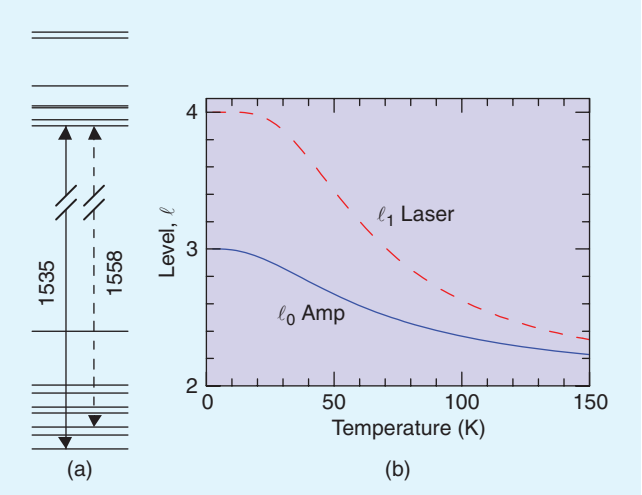


Figure 4. Er:Sc_2O_3, λ_P = 1535 nm, λ_L = 1558 nm: (a) energy levels, pump and laser transitions, (b) temperature dependence of the level parameters.

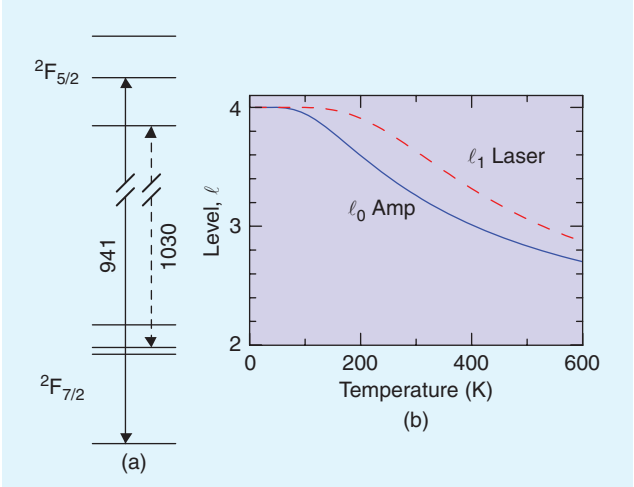


Figure 6. Yb:YAG, λ_P = 941 nm, λ_L = 1030 nm: (a) energy levels, pump and laser transitions, (b) temperature dependence of the level parameters.

In Er:Sc_2O_3, one can see that the level parameters approach their optimum values below ~25 K (Fig. 4).

In the most common scenario for Nd:YAG, where λ_P = 809 nm and λ_L = 1064 nm, there is a 24% quantum defect. Although it has historically been considered a four-level laser, one can see that, at 300 K, the level parameters are closer to three (Fig. 5). This is because the occupation probability for the upper laser level is cut in half by the presence of the lower level of the $^4F_{3/2}$ doublet, separated by only ~85 cm^{-1}. Based on this analysis, it appears that Nd does not deserve the 4-level ranking. Obviously, it does not mean that a good laser cannot be made from Nd, however, the mediocre level parameter has to be compensated by increased doping, or a higher cross section.

The Yb energy level structure is close to ideal because the level separations are good, the alignments are good, and there are no extraneous levels close to the upper laser level, or lower pump level. For λ_P = 941 nm, λ_L = 1030 nm, the quantum defect is 9%. One can see that ℓ_1 ~ 3.5 at 300 K, and rises to close to four at 200 K (Fig. 6).

Using eleven pump and laser transitions in well-known rare-earth ions as examples, one can see that ℓ_0 and ℓ_1 span the range from two to four (Fig. 7). The systems that suffer from thermal population of the lower laser level or the upper pump level have higher level parameters at 80 K. The systems that rely on thermal excitation to populate the lower pump level or the upper laser level may have higher level parameters at 300 K.

The search for systems with a low quantum defect inevitably leads to a departure from the ideal case of a four-level-system. At some point, thermal population of either the upper pump level or the lower laser level will reduce the gain at λ_L, and reduce the absorption at λ_P. Ground state absorption at λ_L will become a factor, or absorption saturation at λ_P, or both.

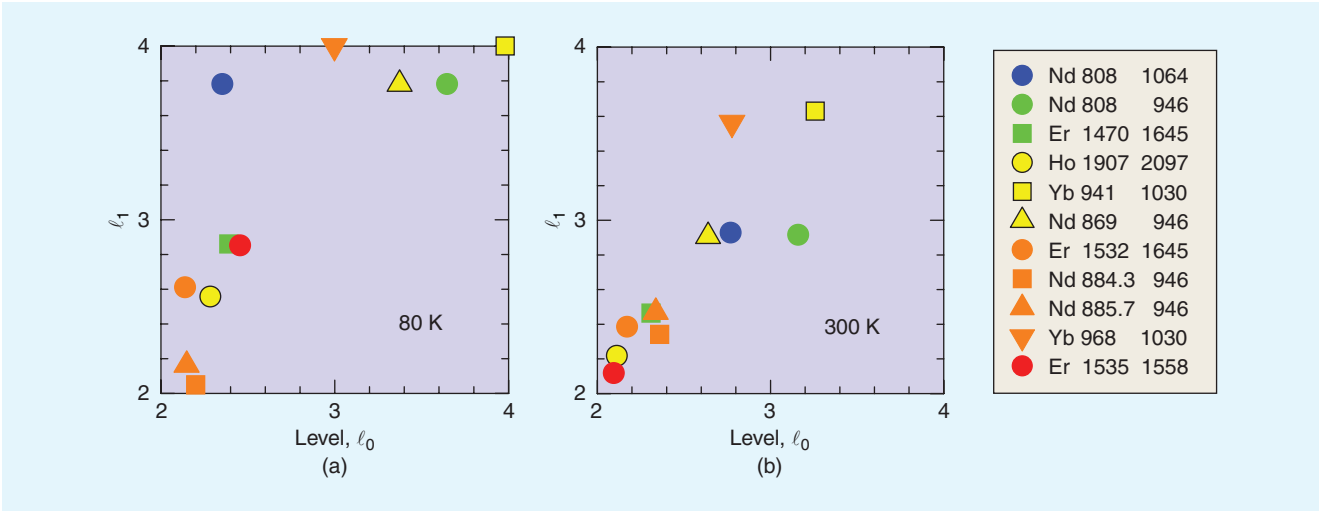


Figure 7. ℓ_1 vs ℓ_0 for a variety of known lasers at (a) 80 K and (b) 300 K. The color is keyed to the quantum defect. The host material is YAG in all cases, except in the last case, where the host is Sc_2O_3.

Approaches to High-Average-Power Solid-State Lasers

There are several other techniques for dealing with the heat load in solid-state lasers. The thin disk laser operates in reflection so that it can have one entire face in contact with a heat sink, therefore a short thermal path. The cavity propagation axis is nearly normal to the surface, and thus parallel to the thermal gradients [9]. Radiation balancing compensates the heat deposited as a result of every stimulated emission by pumping to the red side of the fluorescence peak, so that the average spontaneous emission removes heat [10]. Cryogenic lasers have attracted renewed interest because of improved thermal conductivity and an index less sensitive to temperature, as well as increased cross sections and reduced ground state absorption [11,12]. Fiber lasers can have efficient heat removal due to the high surface to volume ratio [6]. The heat capacity laser circumvents the heating problem by operating multiple slabs, each with a low duty cycle [13].

Advances in Low-Quantum-Defect Pumping

In the most common configuration for diode-pumped Nd:YAG, five different manifolds are populated, $\lambda_P = 808$ nm and $\lambda_L = 1064$ nm, therefore the QD is 24% (see Table I). If the pumping and lasing transitions are chosen to be between levels in the same two manifolds, e.g. with $\lambda_P = 869$ nm and $\lambda_L = 946$ nm, the quantum defect can be reduced to 8%. Changing to Yb^{3+} can reduce the quantum defect to 6%. In these last two examples, the quantum defect is limited in part by the crystal field splitting.

In a host material with a low crystal field strength, e.g. $GdVO_4$, the QD can be reduced to 3%. In a recent experiment, a crystal of Yb:$GdVO_4$ lased at 1,015 nm when longitudinally pumped with a Ti:sapphire laser at 984 nm [14]. The pump beam entered the cavity through a dichroic mirror with high transmission at 984 nm and high reflectivity at 1015 nm. Although the slope efficiency could theoretically be as high as 97% in this case, the experimental result (output power vs incident power) was 32%. Use of $CaGdAlO_4$ and non-colinear pumping has brought the QD in the 1 μm region down to 0.8% [15,16].

In the eye-safer region, where Er:YAG lases at 1645 nm, pumping at 1470 nm reduces the quantum defect (QD) to 11% [17,18], compared to 41% when pumping at ~980 nm. Pumping at 1532 nm further reduces the defect to 7%. A 1.5% QD laser recently demonstrated in Er:Sc_2O_3 at 77 K by pumping at 1535 nm and lasing at 1558 nm [19]. A volume Bragg grating was used for a dichroic input coupler.

The importance of low-quantum-defect lasers to the development of high power solid-state lasers has motivated a quantitative definition of the two-, three-, and four-level laser concept. A simple definition is possible when a unique pump transition can be identified, e.g. when the pumping is by diode lasers. The level parameters ℓ_0 and ℓ_1 defined above should be

	λ_P (nm)	λ_L (nm)	Fractional QD	ℓ_0	ℓ_1
Er:YAG	1470	1645	0.106	2.2	2.5
"	1532	1645	0.069	2.2	2.4
Er:Sc_2O_3	1535	1558	0.015	2.1	2.1
Nd:YAG	808	1064.1	0.241	2.8	2.9
"	808	946	0.146	3.2	2.9
"	869	946	0.081	2.6	2.9
"	884	946	0.065	2.4	2.3
"	886	946	0.064	2.3	2.5
Yb:YAG	941	1030	0.086	3.3	3.6
"	968	1030	0.060	2.8	3.6
Yb:$GdVO_4$	984	1015	0.029	*	*
Yb:$CaGdAlO_4$	979	987.6	0.009	*	*
Ho:YAG	1907	2097	0.091	2.1	2.2

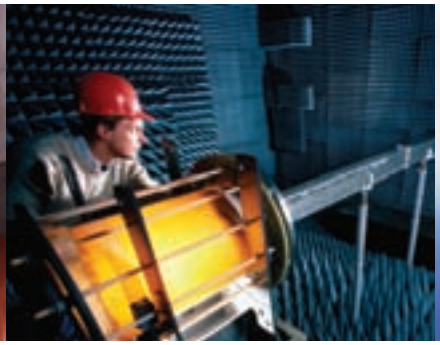
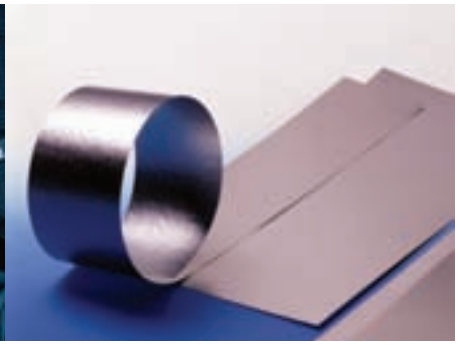
* to be calculated

Table I. Fractional quantum defect, and level parameters, calculated for various gain media, and wavelengths, at 300 K.

particularly useful in these situations where (a) the quantum defect is comparable to k_BT, (b) where extraneous levels are present, and (c) where pumping is with narrow band light.

References

1. A. Yariv and J. P. Gordon, "The Laser," *Proc. of the IEEE*, vol. 1, no. 1, pp. 4–29, Jan. 1963.
2. http://www.globenewswire.com/newsroom/news.html?d=161575
3. J. Marmo, et al., "Joint high power solid state laser program advancements at Northrop Grumman," *Proc. SPIE* vol. 7195, 719507 (6 pp.), 2009.
4. G. D. Goodno, et al., "Brightness-Scaling Potential of Actively Phase-Locked Solid-State Laser Arrays," *IEEE J. Sel. Topics in Quantum Elect.* vol. 13, no. 3, pp. 460–472, May/June 2007.
5. J. Hecht, "Ray guns get real," *IEEE Spectrum*, pp. 29–33, July 2009.
6. http://www.ipgphotonics.com/Collateral/Documents/English-US/PR_Final_10kW_SM_laser.pdf
7. The quantum defect is the difference between the pump photon energy and the laser photon energy.
8. ISI Web of Knowledge, and INSPEC.
9. A. Giesen and J. Speiser, "Fifteen years of work on thin-disk lasers: Results and Scaling Laws," *IEEE J. Sel. Topics in Quantum Elect.* vol. 13, no. 3, pp. 598–609, May/June 2007.
10. S. R. Bowman, N. W. Jenkins, S. P. O'Connor, and B. J. Feldman, "Sensitivity and stability of a radiation-balanced laser system," *IEEE J. Quantum Elect.* vol. 38, no. 10, pp. 1339–1348, Oct. 2002.
11. D. C. Brown, "The Promise of Cryogenic Solid-State Lasers," *IEEE J. Sel. Topics in Quantum Elect*. vol. 11, no. 3, pp. 587–599, May/June 2005.
12. T. Y. Fan, et al., "Cryogenic Yb^{3+}-Doped Solid-State Lasers," *IEEE J. Sel. Topics in Quantum Elect.* vol. 13, no. 3, pp. 448–459, May/June 2007.
13. K. N. LaFortune, et al., "Technical challenges for the future of high energy lasers," *Proc. SPIE* vol. 6454, pg. 64540O (11 pp.) 2007.
14. J. Petit, B. Viana, P. Goldner, D. Vivien, P. Louiseau, and B. Ferrand, "Laser oscillation with low quantum defect in Yb:GdVO4, a crystal with high thermal conductivity," *Opt. Lett.* vol. 29, no. 8, pp. 833–835, April 2004.
15. J. Petit, P. Goldner, and B. Viana, "Laser emission with low quantum defect in Yb:$CaGdAlO_4$," *Opt. Lett.* vol. 30, no. 11, pp. 1345–1347, June 2005.
16. J. Petit, P. Goldner, B. Viana, J. Didierjean, F. Balembois, F. Druon, and P. Georges, "Quest of athermal solid state laser: case of Yb:$CaGdAlO_4$," *conf proceedings.*
17. Y. E. Young, S. D. Setzler, K. J. Snell, P. A. Budni, T. M. Pollak, and E. P. Chicklis, "Efficient 1645-nm Er:YAG laser," *Opt. Lett.* vol. 29, no. NNN, pp. 1075–1077, Month 2004.
18. J. O. White, L. D. Merkle, M. Dubinskii, D. Garbuzov, and I. Khoudryashov, "Resonant pumping and upconversion in 1.6 μm Er^{3+} lasers," *J. Opt. Soc. Am. B* vol. 24, no. 9, pp. 2454–2460, Sept. 2007.
19. N. Ter-Gabrielyan, L. D. Merkle, A. Ikesue, and M. Dubinskii, "Ultralow quantum-defect eye-safe Er:Sc_2O_3 laser," *Optics Lett.* vol. 33, no. 13, pp. 1524–1526, July 2008.

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News

Call for Nominations
IEEE PHOTONICS SOCIETY 2010 Award reminder!!

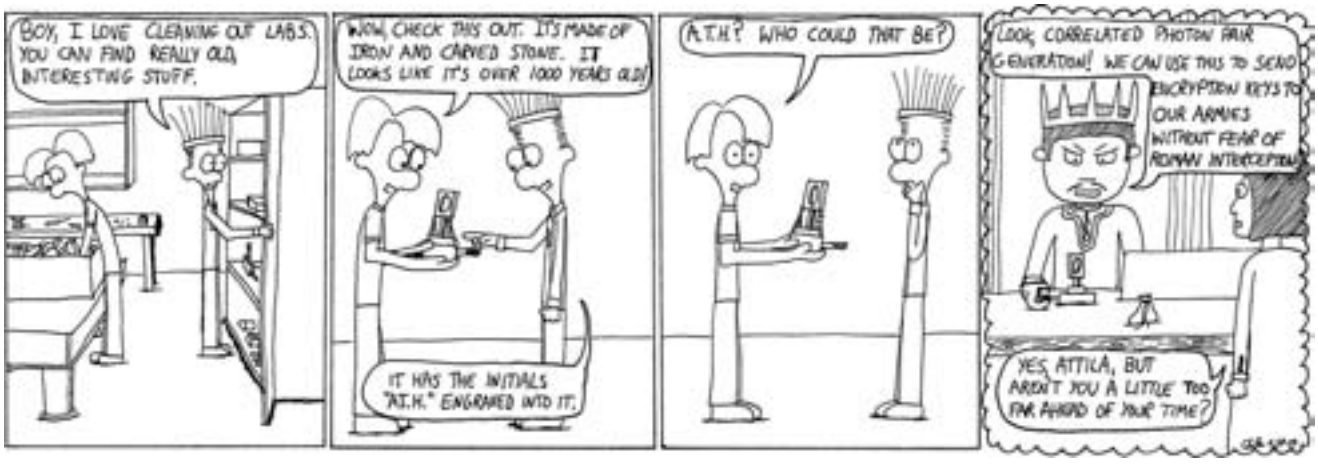
The deadline for submitting nominations for the **Young Investigator Award** is **30 September, 2009.**
In order to facilitate the nomination procedure, the nomination form is found page 11

The IEEE PHOTONICS SOCIETY Young Investigator Award was established to honor an individual who has made outstanding technical contributions to photonics (broadly defined) prior to his or her 35th birthday.

The award shall consist of a certificate of recognition and an honorarium of $1,000. The funding for this award is being sponsored by General Photonics Corporation. Nominees must be under 35 years of age on Sept. 30th of the year in which the nomination is made. The award may be presented either at the Optical Fiber Communications Conference (OFC), or the Conference on Lasers and Electro-Optics (CLEO), to be selected by the recipient.

For full information about the Photonics Society awards program look under the "Awards" tab on the Photonics Society web site (http://www.PhotonicsSociety.org/)

"Nick" Cartoon Series *by Christopher Doerr*



Nomination Form for
IEEE PHOTONICS SOCIETY
Young Investigator Award
Deadline: 30 September

1. Name of Nominee

_____

2. Nominee's Address _____

_____

_____

_____

3. Nominee's Phone: _____ Fax: _____

Email: _____

4. Nominee's birthdate (**REQUIRED** – Nominee must be under 35 years of age on 30 September of year in which nomination is made).

   Year _____ Month _____ Day _____

5. Proposed Award Citation (20 words or less)

_____

_____

6. On separate sheets attach:

   a. Statement of specific contribution(s) that qualify Nominee for Award, as well as other related accomplishments (**maximum of two pages**).

   b. Nominee's curriculum vita

   c. Endorsers: List the names, affiliations, addresses, and emails of individuals who have agreed to write letters of support. (**Minimum of three supporting letters required; maximum of five permitted**. No more than five letters will be reviewed by the Committee. Letters may accompany nomination or be submitted directly to IEEE PHOTONICS SOCIETY prior to the nomination deadline.) Letters of recommendation are to be considered confidential and are not to be released to anyone other than IEEE PHOTONICS SOCIETY awards staff.

7. Your name: _____

   Phone: _____ Fax: _____

   Email: _____

Send nomination information with supporting material to:
IEEE PHOTONICS SOCIETY Awards Committee; 445 Hoes Lane; Piscataway, NJ 08854
Fax: +1 732-562-8434; email: soc.leo@ieee.org

04-09

IEEE PHOTONICS SOCIETY 2009 William Streifer Scientific Achievement Award recipient: Christopher R. Doerr

The IEEE PHOTONICS SOCIETY William Streifer Scientific Achievement Award is given to recognize an exceptional single scientific contribution, which has had a significant impact in the field of lasers and electro-optics in the past 10 years. The award is given for a relatively recent, single contribution, which has had a major impact on the Photonics Society research community. It may be given to an individual or a group for a single contribution of significant work in the field.

Christopher R. Doerr

The IEEE Photonics Society 2009 William Streifer Scientific Achievement Award will be presented to Christopher R. Doerr, "for pioneering research on highly functional integrated optical circuits based on arrayed waveguide grating routers and their implementation in advanced optical networks."

Christopher R. Doerr was born in 1967 in Frankfurt, Germany, on a U.S. Army base, to parents Richard and Marilyn. He grew up in Ohio, and later moved to Massachusetts to attend the Massachusetts Institute of Technology (MIT). He earned a B.S. in Aeronautical/Astronautical Engineering and a B.S., M.S., and Ph.D. (1995) in Electrical Engineering, all from MIT. He attended MIT on an Air Force ROTC scholarship and earned his pilot wings at Williams AFB, Arizona, in 1991. His Ph.D. thesis, on constructing a fiber-optic gyroscope with noise below the quantum limit, was supervised by Prof. Hermann Haus. Since coming to Bell Labs in 1995, Doerr's research has focused on integrated devices for optical communication. He was promoted to Distinguished Member of Technical Staff in 2000, received the OSA Engineering Excellence Award in 2002, and became an IEEE Fellow in 2006 and an OSA Fellow in 2009. Doerr was Editor-in-Chief of IEEE *Photonics Technology Letters* from 2006–2008 and is currently an Associate Editor for the *Journal of Lightwave Technology*. He is married to Neriko Musha and has two children, Hanako and Joe.

He thanks the IEEE Photonics Society and the award committee for creating and maintaining the Striefer award. He is grateful to the people who nominated and wrote recommendation letters for him. He thanks Bell Laboratories for all the support it has given him. He is especially indebted to his colleagues.

IEEE PHOTONICS SOCIETY 2009 Engineering Achievement Award recipient: José R. Salcedo

The IEEE PHOTONICS SOCIETY Engineering Achievement Award is given to recognize an exceptional engineering contribution that has had a significant impact on the development of lasers or electro-optics technology or the commercial application of technology within the past 10 years. It may be given to an individual or a group for a single contribution of significant work in the field. The intention is to recognize some significant engineering contribution which has resulted in development of a new component, a new processing technique, or a new engineering concept which has had a significant impact in either bringing a new technology to the market, significantly improving the manufacturability of a component or device, or creating a new technology which will greatly accelerate or stimulate R&D.

José R. Salcedo

The IEEE PHOTONICS SOCIETY 2009 Engineering Achievement Award will be presented to José R. Salcedo, "in recognition of outstanding technical and leadership contributions to pulsed fiber lasers, in particular all-fiber ring laser architectures, and of his pioneering efforts aimed at developing, promoting and commercializing this technology in Portugal – and later in international markets." The presentation will be made during the Awards Banquet at the 2009 Photonics Society Annual, 4th–8th October at the Ela Quality Resort in Belek-Antalya, Turkey.

José R. Salcedo built his first laser and published his first paper at age 19 while an EE Undergraduate at the University of Porto, Portugal, and received his M.Sc. and Ph.D. degrees from Stanford University under the supervision of Prof. Robert L. Byer and Anthony E. Siegman, respectively. Upon return to his native Portugal, he set up a university curriculum in lasers and fiber optics at the University of Porto and co-founded an associated R&D institute (INESC-Porto).

José founded Multiwave Photonics in 2003, where he has been serving as CEO. Multiwave develops and sells pulsed fiber lasers and specialty optical sources based in fiber-optic technologies for selected industrial, monitoring and medical applications in international markets.

Photonics Society Continues Name Change Celebration at CLEO/QELS 2009

The IEEE Photonics Society is spreading the word about its new name. To celebrate the change, the Society formerly known as LEOS is sponsoring several promotions this year, including Member Lounges and flash drive giveaways for technical attendees at major conferences.

In June, the Photonics Society held a drawing at its booth during CLEO/QELS 2009. The winner, Paul Stysley of NASA, was awarded a set of Sony noise-cancelling headphones. The prize was presented by the Photonics Society Coordinator Giselle Blandin.

The Photonics Society will continue to publicize its new name at major conferences throughout the year. The next Sony noise-cancelling headphones giveaway will be held at the 2009 Photonics Society Annual Meeting in Antalya, Turkey, in October.

Photonics Society Coordinator Giselle Blandin (left) presents the prize to Paul Stysley from NASA.

Photonics in Turkey

Hakan Urey, Alper Kiraz, and Hilmi Volkan Demir

IEEE-Photonics Society Turkish Chapter, which was established in 1999, will be hosting the Annual Meeting of IEEE-Photonics Society in Turkey this year. The Annual Meeting will take place in the famous city of Antalya on the beautiful coastline of the Mediterranean between the dates of October 4–8, 2009. The Meeting will be held in one of the most prestigious hotels in southern Turkey, The Ela Quality Resort.

One of the biggest annual photonics events in Turkey, of which IEEE-Photonics Society Turkish Chapter is involved in the organization, is the Annual National Photonics Meeting, known as FOTONIK, held in different places in Turkey (mostly alternating between Ankara and Istanbul, and also occasionally in some other cities of Turkey). Every year this National Photonics Meeting attracts large attendance of researchers and graduate students working in the fields of optics and photonics in the broadest sense, from various backgrounds and disciplines including physics, applied physics, electrical engineering, mechanical engineering, material science, chemistry, and molecular biology.

FOTONIK covers a large range of optics and photonics related research work undertaken in Turkey such as optical materials and structures (semiconductor epitaxy, amorphous inorganics, organics, low dimensional structures, colloidal synthesis, photonic crystals, plasmonics, metamaterials, optical waveguides, microresonators, etc.), devices (LEDs, solid state lasers, semiconductors lasers, fiber lasers, high power lasers, photodetectors, photovoltaics, cameras, modulators, switches, sensors, actuators, fiber devices, etc.), and systems (2D/3D displays, optical networks, integrated optics and optoelectronics, electro-optics sensor systems, spectrometers, thermal cameras, range finders, locaters, etc.) including their extensive material and device modeling, fabrication, and characterization. The meeting spans a wide spectrum of topics in photonics, among which are optoelectronics, nanophotonics, ultrafast optics and electronics, nonlinear optics, MEMS/NEMS, biophotonics, metrology, fiber optics, microwave photonics, optical signal processing, and optical communications.

Also, the Annual Meeting brings together scientists, engineers, and decision-makers in academia, national research institutes, industry, and funding agencies. In addition, prominent scientists are invited to join the Meeting and get a chance to meet with the photonics community in Turkey. Among the recent years' keynote speakers are Profs. Atac Imamoglu, David A. B. Miller, James S. Harris, Refik Kortan, Niyazi Serdar Sariciftci, El-Hang Lee, Sadık Esener, Nadir Dagli, and Selim Ünlü.

In Turkey, photonics related research is expanding both in academia and industry. Universities in Turkey house a good number of research groups conducting photonics

related research across the country, including Bilkent University, Boğaziçi University, Istanbul Technical University, Koç University, Kocaeli University, Middle East Technical University, Sabancı University, among others.

To give some examples, at Bilkent University located in Ankara, Prof. Hilmi Volkan Demir's group is working on high-quality solid state lighting and photovoltaics using semiconductor quantum dot nanocrystals, resonance energy transfer driven devices, plasmonic devices, biomimetic optoelectronic devices, and bioimplant metamaterial sensors (Figure 1); Prof. Ekmel Ozbay's group is active in the fields of photonic crystals, plasmonics, metamaterials, and Group III-N semiconductor epitaxy and devices; Prof. Orhan Aytur's group is working on nonlinear optics, fiber optics, and lasers; Prof. Haldun Ozaktas' and Prof. Levent Onural's groups are working on optical signal processing and 3D TV; Prof. Ali Kemal Okyay's group is group is developing Si-Ge photodetectors and solar cells; Prof. Ozgur Aktas' group is developing carbon nanotube based sensors; Prof. Heba Yuksel's group is working in free space optical communications in turbulent atmosphere; Prof. Atilla Aydinli's group is working in integrated optics and optoelectronics and plasmonics; Prof. Omer Ilday's group is working on ultrafast optics and fiber based femtosecond lasers and applications; and Prof. Mehmet Bayindir's and Prof. Aykutlu Dana's groups are active in photonic crystal fibers, MEMS/NEMS devices and nanophotonics. Also, in METU in Ankara, for instance, Prof. Cengiz Besikci's group is developing thermal cameras and Prof. Tayfun Akin's group is active in MEMS.

Also, for example, at Koç University located in Istanbul, Prof. Hakan Ürey's group is active in the field of optical MEMS for display, imaging, and spectroscopy applications (Figure 2); Prof. Alper Kiraz's group is working on nano-optics focusing at single molecule imaging and spectroscopy, liquid microdroplet spectroscopy, and optical tweezing (Figure 3); Prof. Alphan Sennaroglu's group is developing CW, pulsed, and femtosecond lasers in mid-IR; Prof. Ali Serpenguzel's group is developing various components and microspheres for optical communication systems; Prof. Ozgur Mustecaplioglu's group is working on theoretical quantum, nonlinear and atomic optics; and Prof. Kaan Guven's group is working on electromagnetic metamaterials, plasmonics, photonic crystals, and many-particle physics.

TÜBİTAK (The Scientific and Technological Research Council of Turkey) established several research laboratories: National Metrology Institute (TÜBİTAK-UME) has state-of-the-art calibration and testing capabilities and conducting research employing various high-precision interferometer systems. Another laboratory among TÜBİTAK institutes is the National Research Institute of Electronics and Cryptology (TÜBİTAK-UEKAE), which has been a leader in Turkey for the studies in the field of cryptology, developing both crypto algorithms and information security devices. TÜBİTAK-UEKAE has also developed the national biomarker system and various spectroscopy instruments for commercial use, and has recently started working on quantum key distribution.

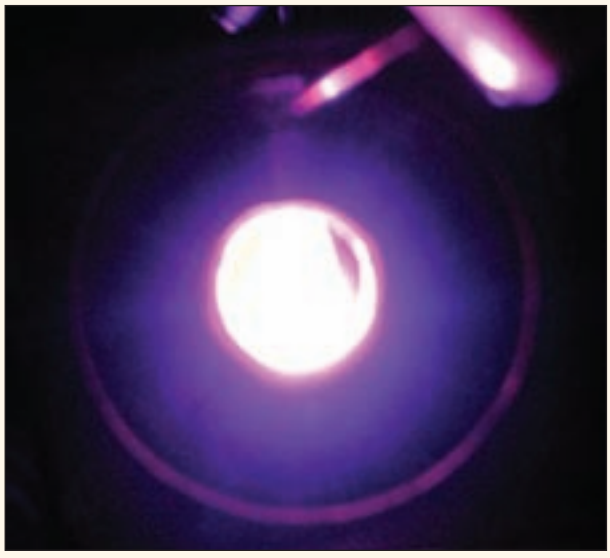


Figure 1. Exemplary white LED integrated with semiconductor nanocrystals for high-quality solid state lighting developed at Bilkent University (Courtesy: H. V. Demir Lab).

Beko (now part of Arçelik, in Istanbul) and Vestel (in Manisa) are two large display manufacturers in Turkey. Vestal designs and manufactures back light units, using their 5000 m^2 cleanroom manufacturing facility. Beko-Arçelik supply about 20% of TVs sold in Europe. Aselsan (in Ankara) is the leading defense research and product company, with a large division dedicated specifically to

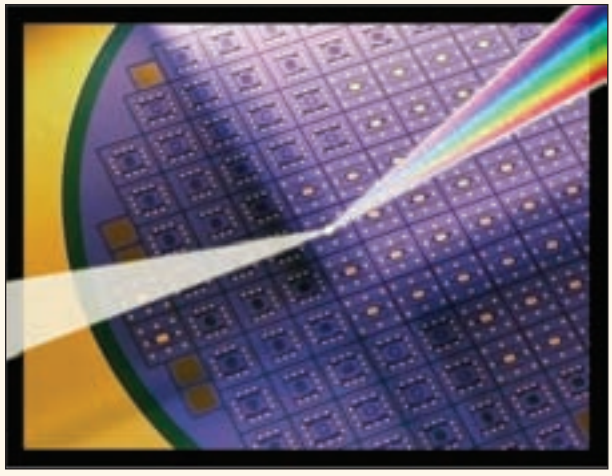


Figure 2. Examples of MEMS laser scanners and grating spectrometer devices developed at Koç University (Courtesy: H. Urey Lab).

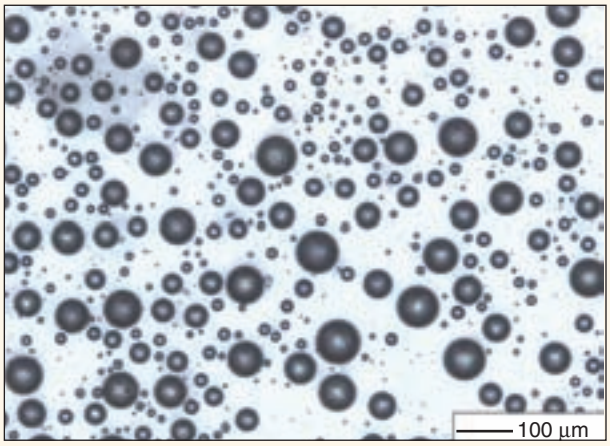


Figure 3. Optical spectroscopy experiments performed on water microdroplets that are standing on a superhydrophobic surface at Koç University (Courtesy: A. Kiraz Lab).

electro-optics systems, in Turkey. Aselsan develops advanced photonics products such as laser range finders, cooled and uncooled thermal imaging cameras, serving primarily the defense industry. Oz Optics (HQ in Canada) has a manufacturing facility in Izmir for fiber optic components and Hes Fiber (in Kayseri) has various fiber optic cable products.

The officers of IEEE-Photonics Society Turkish Chapter presently include Dr. Hilmi Volkan Demir (Chapter Chair), Dr. Hakan Urey (Vice-Chair) and Dr. Alper Kiraz (Treasurer). The Chapter continues its efforts to expand and promote photonics related work and activities both in academia and industry in Turkey and to connect the photonics community in Turkey to colleagues abroad. The Chapter invites and welcomes participants around the globe to join the Annual Meeting of IEEE-Photonics Society, Antalya, on October 4–8, 2009.

Biography

Hakan Urey received the B.S. degree from Middle East Technical University, Ankara, in 1992, and M.S. and Ph.D. degrees from Georgia Institute of Technology in 1996 and in 1997, all in Electrical Engineering. He worked for Bilkent University-Ankara and Georgia Tech Research Institute-Atlanta as a graduate research assistant, and Call/Recall Inc.-San Diego, as a co-op programme exchange student. After completing his Ph.D., he joined Microvision Inc.-Seattle as Research Engineer and he played a key role in the development of the Retinal Scanning Display technology. He was the Principal System Engineer when he left Microvision to join the faculty of engineering at Koç University in 2001. He was promoted to Associate Professor in 2007.

Alper Kiraz has been an assistant professor in the Department of Physics at Koç University since 2004. He received his B.S. degree from Bilkent University in Electrical and Electronics Engineering in 1998, M.S. and Ph.D. degrees from the University of California, Santa Barbara in 2000 and 2002 in Electrical and Computer Engineering. Between 2002 and 2004 he worked as a post-doctoral researcher at the Institute for Physical Chemistry in the Ludwig-Maximilians University, Munich, and received the Alexander von Humboldt fellowship.

Hilmi Volkan Demir received his B.Sc. degree from Bilkent University in 1998, and his M.S. and Ph.D. degrees from Stanford University in 2000 and 2004, respectively, all in electrical engineering. He received his Docent title in optics and photonics from the Turkish Council of Higher Education in 2007. Since September 2004, he has been working as a faculty member at Bilkent University, where he holds joint appointments at the Department of Electrical and Electronics Engineering and at the Department of Physics. He is a recipient of European Young Investigator Award (EURYI) of European Science Foundation (ESF).

Benefits of IEEE Senior Membership

There are many benefits to becoming an IEEE Senior Member:

- The professional recognition of your peers for technical and professional excellence
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- Invited to be on the panel to review Senior Member applications.

Membership Section (cont'd)

The requirements to qualify for Senior Member elevation are a candidate shall be an engineer, scientist, educator, technical executive or originator in IEEE-designated fields. The candidate shall have been in professional practice for at least ten years and shall have shown significant performance over a period of at least five of those years."

To apply, the Senior Member application form is available in 3 formats: Online, downloadable, and electronic version. For more information or to apply for Senior Membership, please see the IEEE Senior Member Program website: http://www.ieee.org/organizations/rab/md/smprogram.html

New Senior Members

The following individuals were elevated to Senior Membership Grade thru May–June:

Sina Khorasani
M. H. Shahine
Zulfadzli Yusoff
Misha Brodsky
Meredith L Reed
William H Robinson
Christopher M Smith
Monica A Taysing-Lara

President's Column

(continued from page 3)

Significant operational savings are also being made, both within the Society and the Institute. Staff travel has been reduced – for example fewer Photonics Society staff attended CLEO to support committee meetings than would be normal, and similarly fewer staff traveled to the IEEE Meeting Series. New and replacement staff appointments are subject to critical review across IEEE. The move to electronic access and away from printed copies of journals is also saving money.

It is therefore difficult to predict where we, as a Society, will be at year end. The metrics we can measure at Society level, such as conference attendees, indicate a significant deficit. However the aggregated accounts, which include changes in publication income, membership income and operational savings, suggest the deficit across all IEEE societies may be quite small. The largest unknowns for us are the performance of the remaining 2009 conferences and our share of income from publications.

… and of the 2010 Budget

At this time of year, we have to finalize the budget for 2010. It is a requirement of IEEE that all societies present a balanced budget. The exception to this is that 3% of reserves can normally be budgeted for new initiatives, but this rule has been suspended for 2010. In addition societies are allowed to spend (but not budget) 50% of any net profit from the previous year. This rule is suspended for 2009 and will almost certainly be suspended in 2010 (in any case it would only be applied if a society shows a surplus in 2009). The Photonics Society always endeavors to run a positive operational budget, and has succeeded in this objective every year except 2003. [In 2003 the Society made a net profit but relied on interest on its reserves to do so, and in 2008 it made a net profit at operational level, but a small loss overall as the 3% rule was used to invest some of our reserves in new initiatives.]

Given the economic downturn and given we are not allowed to access reserves to balance the budget, the budgeting process for 2010 has presented some major challenges. As far as possible, we endeavoring to protect the Society's staff and the benefits we offer to members. The process has been led by Rich Linke and Doug Razzano, who together with Jerry Meyer and Fil Bartoli, have worked closely with the IEEE staff to improve the budget.

There are some painful consequences. We have budgeted to save $640k through a combination of reductions in:

- Publications expenses by revising page counts
- Conference expenses by revising conference budgets
- Committee expenses, promotional materials, new award medals, and reduced outreach, in particular member lounges
- Staff travel
- Headcount by cutting 2.4 FTE staff from budget. [It had been intended to increase headcount to support, for example, the new IEEE Photonics Journal more effectively]

In addition, a number of direct member benefits have been examined saving a further $96k:

- The Society Membership fee will be raised from $25 to $30, the first increase for 5 years
- Chapter subsidies will be reduced from $26k to $13.5k for 2010
- Special chapter grants will be eliminated
- Student Travel Grants will be reduced in number from 16 to 10, and limited to a total expense of $15k
- Student Fellowships will be reduced in number from 12 to 10, with no travel support
- Distinguished Lecturers will be reduced in number from 8 to 4 in 2010

After much discussion, the Board of Governors has accepted these changes, noting that the Society is still able to offer some support to chapters via subsidies and the Distinguished Lecturer program, and to students via travel grants and fellowships. The BoG also noted that the programs can be reinstated if there is an improvement in the economy during the remainder of this year or during 2010.

The Positive News

There is also much to celebrate. In 2009 there will be major improvements in the scope and quality of our services. Also, given the pressure on our staff, there is more need and more opportunity for volunteer involvement. Significant developments include:

- More international activity, including an expansion of Associate VPs for membership and co-sponsorship of new conferences in India and China
- A focus on membership activities through the appointment of Emanuel Istrate as AVP Education and Ju Han Lee as AVP for GOLD
- The launch of a new conference in China (*ACP-CE*) with OSA and SPIE
- The launch of the *IEEE Photonics Journal*
- The launch of *JOCN*
- The new Society name
- A new Society portal – a contract has just been signed and work has begun on this project
- Technical Activities have been reorganized

Finally, and in contrast to most IEEE societies, our membership continues to grow by 2.3% year on year and across all categories (students, affiliates and higher grades). Taken together, these are outstanding achievements and I am immensely impressed by, and proud of, our staff and volunteers.

The 22nd Annual Meeting of the IEEE Photonics Society

The 22nd Annual Meeting of the IEEE Photonics Society will take place on October 4–8 2009 in Belek-Antalya in Turkey. Following its tradition this international conference rotates around the world. Turkey is a rapidly modernizing country bridging Europe and Asia and therefore is ideally placed to host the meeting.

The conference covers all disciplines in the field of photonics. It boasts an impressive number of invited speakers and of contributed papers. The meeting will start with a set of exciting plenary talks dealing with major innovative trends in the photonics field. The plenary program speakers are:

- Philippe M. Fauchet (University of Rochester, USA), Biosensing with Silicon-based Photonic Structures
- Yoshinori Hibino (NTT Corporation, Japan), Photonic Integration Technologies for Large-Capacity Telecommunication Networks
- Ursula Keller (Swiss Federal Institute of Technology Zurich, Switzerland), From Femtosecond to Attosecond Optics
- Ekmel Ozbay (Bilkent University, Turkey), The Magical World of Metamaterials

Apart from the regular sessions the conference will contain three Special Symposia on timely research subjects. These are:

- Optical Networks and Devices for Data Centers (Chair: David V. Plant)
- New Materials for Photonics (Chairs: Siddhartha, Ghosh,Yujie J. Ding, William M.J. Green, Hooman Mohseni)
- The Convergence of Wired and Wireless Services in In-Building and Access Networks (Chairs: Ton Koonen, Dalma Novak)

On Sunday October 4 a series of activities will take place of special interest to the IEEE Photonics Society Membership. These include 6 short courses by excellent lecturers on the following subjects:

- Weng W. Chow (Sandia National Laboratories, USA), Physics and Modeling of Semiconductor Lasers
- James J. Coleman (University of Illinois, USA), Quantum Dots: Materials, Physics, and Devices"
- Takafumi Koike (Hitachi Ltd., Japan), 3D Displays: Theory, Design, and Application
- Tetsuya Mizumoto (Tokyo Institute of Technology, Japan), Optical Nonreciprocal Devices for Photonic Integrated Circuits
- Nabeel A. Riza (University of Central Florida - CREOL, USA), Liquid Crystal Agile Photonics - From Fiber to the Free-Space Domain
- Valery V. Tuchin (Saratov State University, Russia), Coherence-domain and Polarization Methods in Biophotonics

The short courses are free to all students and Photonics Society Members!

Furthermore on Sunday there will be a session on Creative Teaching Methods in photonics and, for the 5th time, a Careers in Research Forum.

For more information, see http://www.ieee.org/organizations/society/leos/LEOSCONF/LEOS2009/index.html

We look forward to meet you at this exciting meeting.

General Chair: M. Selim Ünlü, Boston University, USA

Member-At-Large: Chennupati Jagadish, Australian National University, Australia

Program Chair: Roel Baets, Ghent University, Belgium

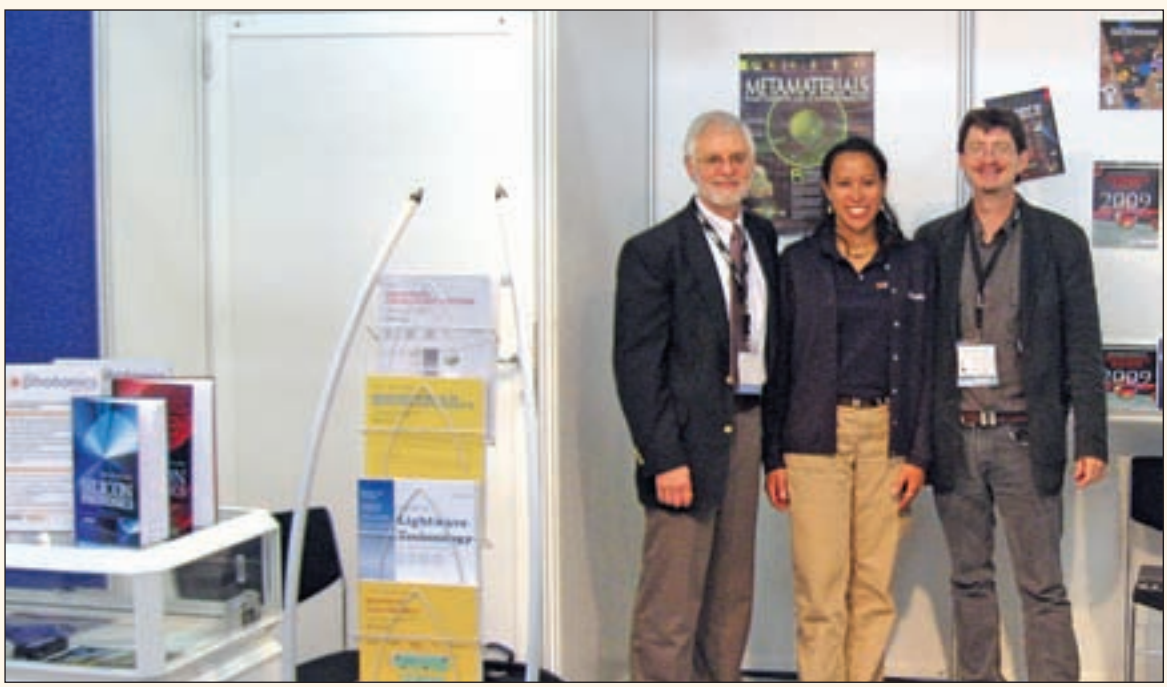

Selim Ünlü


Chennupati Jagadish


Roel Baets

IEEE PHOTONICS SOCIETY at 2009 LASER World of PHOTONICS

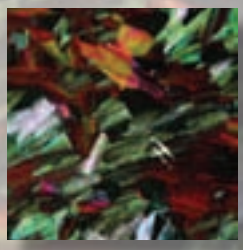
Photonics Society staffer Giselle Blandin (left) oversees activity at the Society's booth at Laser World of Photonics which took place from July 15th to 19th in Munich Germany.



From left to right: Richard Linke - Photonics Society Executive Director, Giselle Blandin – Photonics Society staff, and John Dudley – 2008–2010 Photonics Society Distinguished Lecturer.

2009
IEEE PHOTONICS SOCIETY INTERNATIONAL CONFERENCE ON

Optical MEMS & Nanophotonics



17-20 August

HILTON CLEARWATER BEACH
Clearwater Beach, FL USA

Paper Submission Deadline: **1 May 2009** | Pre-Registration Deadline: **10 July 2009**

CALL FOR PAPERS

6TH INTERNATIONAL CONFERENCE ON
GROUP IV PHOTONICS

GFP 2009

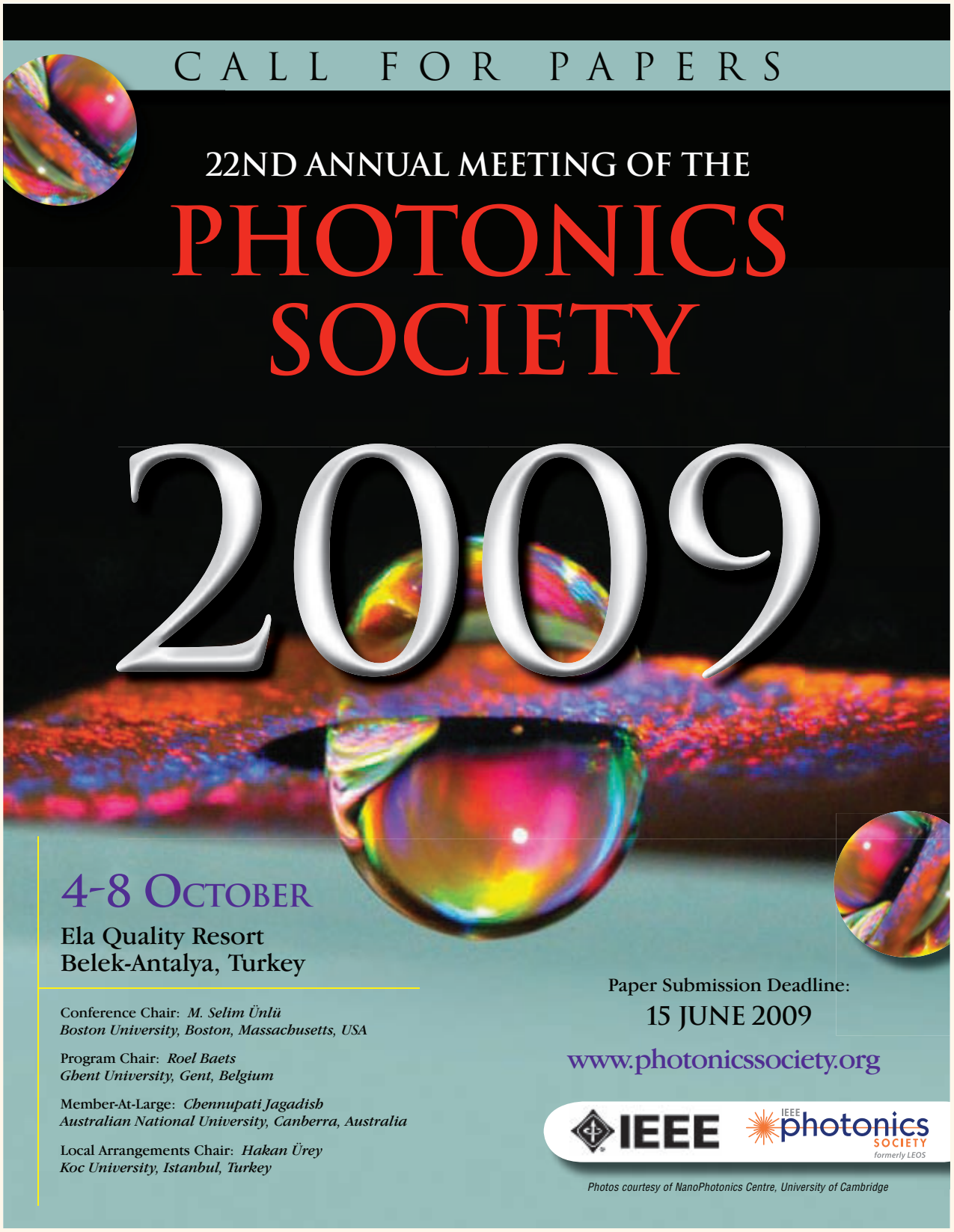
9-11 SEPTEMBER

INTERCONTINENTAL MARK HOPKINS
San Francisco, California, USA

PAPER SUBMISSION DEADLINE:
8 MAY 2009

CONFERENCE PRE-REGISTRATION DEADLINE:
10 AUGUST 2009

Conference Section (cont'd)


CALL FOR PAPERS
22ND ANNUAL MEETING OF THE
PHOTONICS SOCIETY
2009
4-8 OCTOBER
Ela Quality Resort
Belek-Antalya, Turkey
Conference Chair: M. Selim Ünlü
Boston University, Boston, Massachusetts, USA
Program Chair: Roel Baets
Ghent University, Gent, Belgium
Member-At-Large: Chennupati Jagadish
Australian National University, Canberra, Australia
Local Arrangements Chair: Hakan Ürey
Koc University, Istanbul, Turkey
Paper Submission Deadline:
15 JUNE 2009
www.photonicssociety.org
IEEE
IEEE photonics SOCIETY
formerly LEOS
Photos courtesy of NanoPhotonics Centre, University of Cambridge

Hilton Golf Resort & Spa at Buffalo Thunder, Santa Fe, NM USA

Photo: Jack Parsons

21st Annual Workshop on Interconnections within High Speed Digital Systems

2-5 May 2010

Sponsored by the IEEE Photonics Society
and in cooperation with the IEEE Computer Society

IEEE photonics SOCIETY formerly LEOS

PRE-REGISTRATION DEADLINE: 9 APRIL 2010

www.photonicssociety.org

Publication Section

IEEE Photonics, a new publication of IEEE, is now accepting submissions. The journal offers rapid publication of high quality research results on the broad, interdisciplinary area of photonics

http://mc.manuscriptcentral.com/pj-ieee

Journal Scope

Breakthroughs in the generation of light and in its control and utilization have given rise to the field of Photonics, a rapidly expanding area of science and technology with major technological and economic impact. Photonics integrates quantum electronics and optics to accelerate progress in the generation of novel photon sources and in their utilization in emerging applications at the micro and nano scales spanning from the far-infrared/THz to the x-ray region of the electromagnetic spectrum.

Contributions addressing issues ranging from fundamental understanding to emerging technologies and applications are within the scope of the Journal.

The Journal includes topics in:

- Photon sources from far infrared to x-ray
- Photonics materials and engineered photonic structures
- Ultrafast, attosecond, high field and short wavelength photonics
- Biophotonics including DNA photonics
- Nanophotonics
- Magnetophotonics
- Fundamentals and applications of light propagation and interaction; nonlinear effects
- Optical data storage
- Integrated optics and optoelectronics
- Micro and Nano Opto-Electro Mechanical Systems (MOEMS)
- Microwave photonics
- Optical sensors, imaging, and visualization
- Quantum computing

Dear Colleagues,

On March 1st 2009 the IEEE Photonics Society launched the Manuscript Central submission website for a new online publication.

IEEE Photonics Journal.

The new ***IEEE Photonics Journal*** reflects the full breadth of the technical community engaged in the generation, control, detection, and utilization of electromagnetic radiation, spanning frequencies from terahertz to x-rays.

A key benefit of the ***IEEE Photonics Journal*** is that it offers rapid publication on IEEE Xplore, making use of a new streamlined production process within IEEE. The expanded capabilities supported by online publication will allow open-access and multimedia options for authors, while providing significantly increased value to readers. The Journal will maintain the highest standards of editorial quality and fair-minded rigorous review processes, characteristic of all IEEE journals.

In recognition of the wide impact of photonic science and technology, the IEEE Nanotechnology Council and the Antennas and Propagation, Consumer Electronics, Electron Devices, Engineering in Medicine and Biology, and Nuclear and Plasma Sciences Societies are technically co-sponsoring the Journal.

I invite you to submit your original research results to this exciting new Journal. The first articles have been posted online so we are off to a great start. With your help and the support of an outstanding editorial board, I envisage the ***IEEE Photonics Journal*** to grow into a premier forum for the rapid dissemination of the latest research in all fields of photonics science and technology.

Carmen S. Menoni, Editor-in-Chief
Colorado State University
Fort Collins, CO 80523, USA

Biography

Carmen S. Menoni received her PhD in Physics from Colorado State University in 1987. Since 1991, she has been a member of the faculty in the Department of Electrical & Computer Engineering at CSU where she is presently Professor. Prof. Menoni's research bridges from material to optical sciences. She is engaged in the growth and characterization of high bandgap oxide materials for the engineering of interference coatings for high power lasers. As faculty member of the NSF Center for Extreme Ultraviolet Science & Technology Prof. Menoni and her group are using bright coherent beams of light of wavelengths between 10–50 nm for optics applications such as high resolution imaging and ablation. Prof. Menoni and her team received in 2008 a "R&D 100 Award" for the invention of a table-top 46.9 nm wavelength microscope that can capture images in a single 1 nanosecond with wavelength spatial resolution. Menoni's work is published in over seventy archival journal publications and numerous conference presentations.

Prof. Menoni is fellow of the American Physical Society, and the Optical Society of America. She is a senior member of the Institute of Electrical & Electronic Engineers (IEEE). Prof. Menoni has served IEEE Photonics in the capacity of the Board of Governors member from 2006–2008 and Vice-President for Publications 2007–2008.

IEEE PHOTONICS TECHNOLOGY LETTERS

by El-Hang Lee, new Editor-in-Chief

Greetings! I am El-Hang Lee, a newly appointed Editor-in-Chief (EIC) of Photonics Technology Letters (PTL), and would like to extend my warmest greetings to all the members of the IEEE Photonics Society, who, under the great leadership and services of former Society officials, Editors-in-Chief, Associate Editors (AEs), and PTL staff members, have made PTL one of the most respected academic journals.

With much help and patience, Chris Doerr, former EIC, trained me as a new EIC in January under the supervision of Prof. Rodney Tucker, Vice President of Publications. Both Chris and I have tried our best to make the whole editorial transition process as smooth as possible. Please do not hesitate to inform me or the editorial office if you encounter any difficulty or discomfort in the editorial process of your manuscript. Together with the AEs and PTL staff members, I will always make myself available to help your publication process a truly rewarding experience.

As a new EIC, I have a vision for PTL and I will share it with the Society members and leaders as we move along. But, I will always uphold the honored tradition of PTL and will continue to build our future upon that foundation. I salute all the past and present Society leaders, EICs, AEs, and PTL staffs members, who, with their long hours of dedicated service, have made the Society and PTL that we are all proud of. And, I will

try to live up to the expectations and dreams of the Society. I have lived both in the West and in the East, about 20 years each, through my professional years, working in academic and research institutions, from entry level to the leadership positions, being a member of the Society and knowing and loving PTL. I will bring all of my broad-based global experience to help PTL achieve its best that the Society will cherish for many years into the 21st century. This, of course, would not be possible without your continuing support for PTL

We are all very well aware that the most important value of PTL has been the "novelty" of the papers to make its impact strong and clear to the advancement of the photonics technology as applicable for the welfare of the human society at large. In my term, too, I will continue to emphasize the "novelty" of the papers, delivered in good English. We will continue to improve the standard of PTL, often measured by the journal impact factor. The reason for this is clear: Photonics technology will become ever more important in the 21st century information age and PTL has a mission to lead the frontier in this new age.

Certainly, we are all witnessing, like the "age of electronics" in the 20th century, an "age of photonics" rising over the 21st century. We are moving into an age when the importance of the "science and engineering of light" is never greater. There is no doubt that the Society has been the leading torch-carrier in bringing in the new age. And, PTL, being at the core and forefront of the Society, helped the Society to make the great progresses in the 20th century information technology. I was very pleased to learn from Chris Doerr that according to Wikipedia PTL was credited for making "photonics" an official word in the English language. We now realize that the Society, with its new name, faces a new mission and challenge to make the 21st century information age shine ever more brightly with optics and photonics. PTL has a task to make this happen. Truly I am a lucky person to play a role in this process. Together, we will hold our "torch of light" high to shine our ways into the future.

I will be closely following the visions and guidance of our Society leaders and especially new Vice President of Publications, Prof. Rodney Tucker, who has been my role model for nearly 30 years. He is dedicated to making the Society journals prosper and flourish.

I will be also working closely with all the outstanding staffs of PTL: Linda Matarazzo, Sylvia Flores, Daphne Moses, and Eileen McGuinness, who will continue to support all the AEs and authors with their excelling assistance. None of us will be functional without their dedication, support, outstanding professionalism and especially the spirit of services for the best of the community.

Now, I welcome you all to join me in taking another fantastic journey into the new world of photonics technology of the 21st century.

Thank you and best wishes to you all!

El-Hang Lee
Editor-in-Chief
IEEE Photonics Technology Letters

Biography

Prof. Dr. El-Hang Lee is a Distinguished University Professor of Information Technology at INHA University, South Korea. Prof. Lee earned B.S.E.E. (summa cum laude) from Seoul National University, Korea in 1970 and M.S., M.Phil., and Ph.D. degrees in Applied Physics from Yale University in 1973, 1975 and 1977, respectively. [Advisors: Prof. John. B. Fenn, Yale Nobel Laureate, Chemistry, 2002, and Prof. Richard. K. Chang, Henry Ford II Professor, from Prof. N. Bloembergen, Harvard Nobel Laureate, Physics, 1981] Prof. Lee conducted teaching, research and management at Yale, Princeton, AT&T, ETRI (vice president), KAIST, and INHA in the fields of semiconductor physics, materials, devices, optoelectronics, photonics, and optical communication. He is the Founding Dean, School of Communication and Information Engineering; Dean, Graduate School of the Information Technology and Telecommunications; Founding Director, OPERA (Optics and Photonics Elite Research Academy) and m-PARC (micro/nano-Photonics Advanced Research Center); Vice President, Optical Society of Korea; Founding President, IEEE-LEOS Korea; Founding Director, SPIE-Korea. Prof. Lee published 240 international refereed SCI-covered archival journal papers and review papers; 640 international conference

presentations; 100 plenary, keynote, and invited talks in international conferences; Edited international books and proceedings; Holds 120 international patents; Served 80 times as international conference chair, committee member, and advisor. Prof. Lee is a Fellow of the APS, IEEE, IEE (UK), OSA, SPIE, and a Life Fellow, Korean Academy of Science and Technology. Prof. Lee is a recipient of 20 national and international awards, including the King Se-Jong Award, Grand Science Award, Presidential Medal of Honor (Science), Korea, the IEEE Third Millennium Medal, and the 2007–2009 IEEE/LEOS Distinguished Lecturer Award.

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Fax (office): +82-32-865-8845
Cell Phone: +82-10-6513-3472
E-mail: ehlee@inha.ac.kr
Home Page: www.opera.re.kr or www.inha.ac.kr

IEEE/OSA Journal of Lightwave Technology

The *IEEE/OSA Journal of Lightwave Technology* is comprised of original contributions covering work in all aspects of optical science, technology, and engineering. Published manuscripts report original theoretical and/or experimental results that advance the technological base of lightwave technology. Topics of interest include the following:

- Active and passive lightwave components (Light sources, detectors, repeaters, switches, interconnections, fiber sensors, etc.)
- Integrated optics/optoelectronics
- Fiber and cable technologies
- Systems & Subsystems
- Networks & Switching
- New applications
- Unique field trials

System-oriented manuscripts are concerned with systems that perform a function not previously available, out-perform previously established systems, or represent enhancements in the state-of-the-art in general. Issues may also contain invited articles of either a review or tutorial nature, of value to most readers, along with issues devoted to a single "special topic," also closely related to the topics above.

The Journal of Lightwave Technology is published jointly with the Optical Society of America and the following seven IEEE Societies: Photonics, Communications, Electron Devices, Microwave Theory & Techniques, Aerospace & Electronic Systems, Instrumentation and Measurement, Ultrasonics, Ferroelectrics & Frequency Control.

A Message from the JLT Editor-in-Chief:
"On the Go to Reduce Time to Publication"

Dear JLT Authors, Readers, Reviewers, and Enthusiastic Supporters

It has been a little over two years since I took over the position of Editor in Chief in early 2007. I would like to thank you for your continued devotion and support to JLT. During the past two years, following the blazing trails of the past Editors in Chief, I have focused my effort on maintaining the JLT tradition, i.e. managing quality with growth. I am pleased to report that the submission quantity has continued to grow to 959 papers in 2008, which is nearly 25% increase from 2006. The number of pages in print has increased steadily to nearly 4000 pages in 2008. I recruited 17 excellent new Associate Editors (AEs) to help manage the growth as well as replacing ten AEs whose term ended. Also in 2008, we had five special issues on hot, emerging topics, which served as magnets to attract excellent submissions. We thank the Guest Editors for working diligently to bring these special issues to you in a timely fashion.

Until the end of 2008, the average time it takes a paper from submission to first decision, final decision and online publication are 2.8, 5.2, and 8.9 months, respectively, which are very competitive with other comparable journals. Recently, I received reports that papers were delayed substantially in production, i.e. after the final manuscripts were submitted to the IEEE. I discussed the concerns with the editors in IEEE Publications and the staff at the JLT Editorial Office. I am happy to report that we were able to isolate the problems and challenges. Moreover, we brainstormed and decided to make the following changes in our process to facilitate more timely reviews and publications.

1) First, and most importantly, JLT started posting pre-prints beginning April 8, 2009. This means that as soon as the finalized manuscripts are submitted by the authors, they will be posted online within 1–2 weeks. This will reduce submission-to-print time by ~3 months. The preprints are citable, can be searched by Xplore, and will be replaced by the published version once the edited version is published. The authors will be required to add a copyright statement in their manuscript.
2) Part of the publication delay experienced was due to the delay of the completion of special issues. The special issues are like buses, which have to wait for late passengers before departing, and hence blocking the loading and departure of smaller cars (independent contributed papers in this analogy). In the future, we will plan the special-issue close-out carefully so that delays will not impact independent contributions.
3) The IEEE Publications Operations staff has promised more editor hours to help support JLT's growth.
4) The JLT Editorial Office will work closely with IEEE Publications Operations to ensure timely publication.
5) The Editorial Board is committed to make every effort to provide speedy reviews and decisions.
6) We ask the authors' cooperation in reducing the revision cycle. The authors will be given a shorter revision period, two and four weeks for minor and major revisions, respectively.

With all these modifications, we believe we will make JLT one of the fastest journals for publishing high-quality journal-length articles. Please feel assured that, despite of the rapid growth and our new emphasis on speed, JLT will neither compromise on quality nor its technical scope. We will continue to cover the full spectrum of technical topics with excellent quality original and invited papers. WE look forward to your strong support and participation.

Respectfully submitted,
Connie Chang-Hasnain, Editor-in-Chief, IEEE/OSA Journal of Lighwave Technology
Electrical Engineering and Computer Sciences Department
University of California
Berkeley, CA 94720 USA

Biography

Connie J. Chang-Hasnain (M'88–SM'92–F'98) was born on October 1, 1960. She received the B.S. degree from the University of California, Davis, in 1982 and the M.S. and Ph.D. degrees from the University of California, Berkeley, in 1984, and 1987, respectively, all in electrical engineering.

She was a member of Technical Staff at Bellcore from 1987 to 1992. From 1992 to 1995, she was an Assistant Professor of Electrical Engineering at Stanford University, Stanford, CA. Since 1996, she has been a Professor of Electrical Engineering, University of California, Berkeley. She holds the John R. Whinnery Chair Professor position and is the Chair of the Nanoscale Science and Engineering Graduate Group. She is also the Director of the Center for Optoelectronic Nanostructured Semiconductor Technologies (CONSRT). Her research interests are in nano-materials, optoelectronic devices, and applications.

Dr. Chang-Hasnain is a fellow of the OSA, IEEE and IEE. She was named a Presidential Faculty Fellow, a Packard Fellow, a Sloan Research Fellow, and Outstanding Young Electrical Engineer of the Year by Eta Kappa Nu. She received the 1994 IEEE LEOS Distinguished Lecturer Award, the 2000 Curtis W. McGraw Research Award from the American Society of Engineering Education, the 2003 IEEE William Streifer Scientific Achievement Award, and the 2005 NAS Gilbreth Lecturer Award, 2007 OSA Nick Holonyak Jr Award and 2009 Microoptics Award (MOC). She was recently named a Guggenheim Memorial Foundation Fellow and National Security Science and Engineering Faculty Fellow. She is an Honorary Member of A.F. Ioffe Institute since 2005 and Editor in Chief of JLT since 2007.

IEEE JOURNAL OF QUANTUM ELECTRONICS

The Journal of Quantum Electronics is the preeminent long-form journal in the field of photonics. It comprises original contributions, both regular papers and letters, describing significant advances in the understanding of quantum electronics phenomena or the demonstration of new devices, systems, or applications. Its authors and contributors report new developments in systems and applications that emphasize quantum electronics principles or devices. The scope of JQE encompasses the generation, propagation, detection, and application of coherent electromagnetic radiation having wavelengths below one millimeter (i.e., in the submillimeter, infrared, visible, ultraviolet, etc., regions).

Editorial Board

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Robert J. Lang

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IEEE PHOTONICS SOCIETY Editorial Office

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Biography

Robert J. Lang received his BS from Caltech, MS from Stanford, and Ph.D. from Caltech. After a postdoc at Standard Elektrik Lorenz AG, he worked at NASA's Jet Propulsion Laboratory carrying out research on semiconductor lasers and optoelectronics. In 1992 he joined Spectra Diode Laboratories, where he led research on high-power lasers including unstable resonator diode lasers, high-power DFBs, tunable lasers and others, eventually becoming Vice-President of Research and Development. In 2000, he took over Component Packaging Development for SDL, Inc., developing and delivering Telcordia-qualified high-power pump laser modules to manufacturing and sale.

In 2001, he left SDL (then JDSU) to focus on his longtime passion, origami, an art in which he is a recognized world master. Since then he has divided his time between exhibitions, writing, and lecturing on origami and its underlying mathematics in forums both artistic and technical, and consulting in lasers and optoelectronics, most recently in the area of speckle-based position sensors. He is the author or co-author of 80 refereed papers and over 50 patents awarded and pending. In 2009 he was awarded Caltech's highest honor, the Distinguished Alumni Award. He is a member of the IEEE Photonics Society, a Fellow of the Optical Society of America, and the current Editor-in-Chief of the *IEEE Journal of Quantum Electronics*.

Preliminary Call for Papers

Announcing an Issue of the IEEE *JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS* on Enabling technologies for digital optical communication systems

Submission Deadline: September 1, 2009

IEEE Journal of Selected Topics in Quantum Electronics invites manuscript submissions in the area of *components and subsystems* for advanced digital optical communication systems, including free-space optical communication links, fiber-optic transport networks, optical access systems, optical interconnects, as well as chip-to-chip and on-chip optical communications.

The team of Guest Editors for this issue will be announced shortly.

The deadline for submission of manuscripts is **September 1, 2009**; publication is scheduled for September/October of 2010.

Online Submission is Mandatory at: http://mc.manuscriptcentral.com/pho-ieee. Please select the Journal of Selected Topics Of Quantum Electronics Journal from the drop down menu.

For inquiries please contact directly at:
Chin Tan-yan
IEEE/Photonics Society Publications Coordinator
445 Hoes Lane, Piscataway, NJ 08854, U.S.A.
Phone: 732-465-5813, Email: c.tan-yan@ieee.org

For all papers published in *JSTQE*, there are voluntary page charges of $110.00 per page for each page up to eight pages. Invited papers can be twelve pages and Contributed papers should be 8 pages in length before overlength page charges of $220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper. Additional charges will apply if color figures are required.

The following supporting documents are required during manuscript submission:

1) .doc manuscript (double columned, 12 pages for an Invited Paper. Contributed paper should be double columned, 8 pages in length.) Bios of ALL authors are mandatory, photos are optional. You may find the Tools for Authors link useful: http://www.ieee.org/web/publications/authors/transjnl/index.html
2) Completed the IEEE Copyright Form. Copy and paste the link below: http://www.ieee.org/web/publications/rights/copyrightmain.html
3) Completed Color Agreement/decline form. (Please email c.tan-yan@ieee.org to request for this form.)
4) .doc list of ALL Authors FULL Contact information as stated below: Last name (Family name): /First name: Suffix (Dr/Prof./Ms./Mr):/Affiliation:/Dept:/Address:/Telephone:/Fax:/Email:/ Alternative Email:

Preliminary Call for Papers

Announcing an Issue of the IEEE *JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS* on Next-Generation Solar Cells

Submission Deadline: October 1, 2009

IEEE Journal of Selected Topics in Quantum Electronics invites manuscript submissions in the area of solar cells that make use of organic molecules and polymers. The field of organic photovoltaics has been expanding rapidly, driven largely by the promise of a low-cost, large area, flexible source of renewable energy. The purpose of this issue of JSTQE is to highlight the recent progress and future trends in the various approaches that have been and are being developed for producing highly efficient, stable organic solar cells.

Broad technical areas include but are not limited to the following topics:

- Organic solar cells based on small molecules and/or polymers
- Dye-sensitized photo-electrochemical solar cells
- Hybrid organic-inorganic solar cells
- Device performance and efficiency
- Device lifetime and reliability
- Device physics and chemistry
- Device modeling
- Novel processing methods
- Fundamental studies relevant to charge carriers, excitons, and interfaces
- Low-cost fabrication techniques for large area deposition including roll-to-roll printing process
- Flexible substrates and barrier films for printable organic solar cells

The Guest Editors for this issue are: **Zakya Kafafi**, National Science Foundation – Virginia, USA; **René Janssen**, Eindhoven University of Technology – Eindhoven, The Netherlands; **Kwanghee Lee**, Gwangju Institute of Science & Technology (GIST) – Gwangju, Korea; **Barry P. Rand**, IMEC – Leuven, Belgium.

The deadline for submission of manuscripts is **October 1, 2009**; publication is scheduled for November/December **of 2010**.

Online Submission is Mandatory at: http://mc.manuscriptcentral.com/pho-ieee Please select the Journal of Selected Topics Of Quantum Electronics Journal from the drop down menu.

For inquiries please contact directly at:
Chin Tan-yan
IEEE/Photonics Society Publications Coordinator
445 Hoes Lane, Piscataway, NJ 08854, U.S.A.
Phone: 732-465-5813, Email: c.tan-yan@ieee.org

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The following supporting documents are required during manuscript submission:

1) .doc manuscript (double columned, 12 pages for an Invited Paper. Contributed paper should be double columned, 8 pages in length.) Bios of ALL authors are mandatory, photos are optional. You may find the Tools for Authors link useful: http://www.ieee.org/web/publications/authors/transjnl/index.html
2) Completed the IEEE Copyright Form. Copy and paste the link below: http://www.ieee.org/web/publications/rights/copyrightmain.html
3) Completed Color Agreement/decline form. Please email c.tan-yan@ieee.org to request this form.
4) .doc list of ALL Authors FULL Contact information as stated below: Last name (Family name): /First name: Suffix (Dr/Prof./Ms./Mr):/Affiliation:/ Dept:/Address:/Telephone:/Fax:/Email:/ Alternative Email:

Call for Papers

Announcing a Special Issue of the IEEE/OSA Journal of display Technology on 3-D Displays and Visualization

Submission Deadline: October 10, 2009

The IEEE/OSA Journal of Display Technology (JDT) invites submission of original manuscripts reporting recent advances for a special issue on 3D displays, 3D TV, 3D video, and 3D visualization. Contributed papers on all aspects of this technology are welcome, including but not limited to various hardware, algorithms, devices, sensors, systems, architectures, and applications in 3D displays, 3D TV, 3D video, and 3D visualization. Various topics on 3D displays, 3D TV, 3D video, and 3D visualization to be covered in the special issue include, but are not limited to optical devices, optical and photonics systems, hardware, applications, holographic techniques, volumetric displays, stereo, multi view imaging, stereo, sensors, biomedical and biological applications, algorithms for 3D image processing to improve performance, and psychological and visual sciences of 3D perception.

The Guest Editors for this issue are **Dr. Bahram Javidi,** Board of Trustees Distinguished Professor, University of Connecticut; **Prof. Manuel Martínez Corral,** University of Valencia, Spain; **Dr. Pietro Ferraro,** National Institute for Applied Optics (INOA), Italy; and **Prof. Osamu Matoba,** Kobe University, Japan.

The deadline for submission of manuscripts is **10 October 2009** and publication is tentatively scheduled for the **October 2010** issue. Manuscripts should conform to requirements for regular papers (up to 8 double-column, single-spaced journal pages in length, keywords, biographies, etc.). All submissions will be reviewed in accordance with the normal procedures of the Journal. The IEEE Copyright Form should be submitted after acceptance. The form will appear online in the Author Center in Manuscript Central after an acceptance decision has been rendered.

For all papers published in JDT, there are voluntary page charges of $110.00 per page for each page up to eight pages. Invited papers can be twelve pages in length before mandatory overlength page charges of $220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper.

Authors may opt to have figures displayed in color on IEEE Xplore at no extra cost, even if they are printed in black and white in the hardcopy edition. Additional charges will apply if figures appear in color in the hardcopy edition of the Journal.

Manuscripts should be submitted electronically through IEEE's Manuscript Central: http://mc.manuscriptcentral.com/jdt-ieee. Be sure to select "**3-D Display and Visualization Special Issue**" as the Manuscript Type, rather than "Original Paper." This will ensure that your paper is directed to the special issue editors. IEEE Tools for Authors are available online at: http://www.ieee.org/organizations/pubs/transactions/information.htm

Inquiries can be directed to Lisa Jess, Publications Administrative Assistant, IEEE Photonics Society Editorial Office, l.jess@ieee.org (phone +1-732-465-6617; fax +1 732 981 1138).

Call for Papers

Announcing a Special Issue of the IEEE/OSA Journal of display Technology on LCOS Technology

Submission Deadline: December 31, 2009

The *IEEE/OSA Journal of Display Technology* (JDT) invites submission of manuscripts for a special issue. The purpose of this special issue is to document the current status of the Liquid Crystal on Silicon (LCOS) technology through a collection of original papers. Contributed papers on all aspects of this technology are welcome; from issues concerning the drivers and electronic interface, signal processing aspects, chip design, design of the liquid crystal pixels, modeling, development of special materials, associated optical systems to applications in projection displays, pico-projectors, diffractive displays, holograms and communication devices.

The Primary Guest Editors for this issue are **Dr. F. Anibal Fernandez and Dr. Sally E. Day**, University College London, London, UK. Associate Guest Editors are **Dr. Mike Robinson**, RealD, USA, **Dr. Herbert de Smet**, IMEC and University of Ghent, Ghent, Belgium and **Dr. Atsutaka Manabe**, Merck KGaA, Darmstadt, Germany.

The deadline for submission of manuscripts is **31 December 2009** and publication is tentatively scheduled for the **September 2010** issue. Manuscripts should conform to requirements for regular papers (up to 8 double-column,

single-spaced journal pages in length, keywords, biographies, etc.). All submissions will be reviewed in accordance with the normal procedures of the Journal. The IEEE Copyright Form should be submitted after acceptance. The form will appear online in the Author Center in Manuscript Central after an acceptance decision has been rendered.

For all papers published in JDT, there are voluntary page charges of $110.00 per page for each page up to eight pages. Invited papers can be twelve pages in length before mandatory overlength page charges of $220.00 per page are levied. The length of each paper is estimated when it is received. Authors of papers that appear to be overlength are notified and given the option to shorten the paper.

Authors may opt to have figures displayed in color on IEEE Xplore at no extra cost, even if they are printed in black and white in the hardcopy edition. Additional charges will apply if figures appear in color in the hardcopy edition of the Journal.

Manuscripts should be submitted electronically through IEEE's Manuscript Central: http://mc.manuscriptcentral.com/jdt-ieee. Be sure to select "**2010 LCOS Technology Special Issue**" as the Manuscript Type, rather than "Original Paper." This will ensure that your paper is directed to the special issue editors. IEEE Tools for Authors are available online at: http://www.ieee.org/organizations/pubs/transactions/information.htm

Inquiries can be directed to Lisa Jess, Publications Administrative Assistant, IEEE Photonics Society Editorial Office, l.jess@ieee.org (phone +1-732-465-6617; fax +1 732 981 1138).

Call for Papers

Announcing the Joint Special Issue of the *IEEE Transactions on Microwave Theory and Techniques* and the *IEEE/OSA Journal of Lightwave Technology* on Microwave Photonics

Submission Deadline: January 1, 2010

The ***Transactions on Microwave Theory and Techniques*** and the ***IEEE/OSA Journal of Lightwave Technology*** invite manuscript submissions in the area of Microwave Photonics. This special joint issue will focus on the diverse, multidisciplinary field of microwave photonics and will be sent to subscribers of both journals. Microwave photonics focuses on interactions between the optical and the microwave portions of the electromagnetic spectrum, where here the term "microwave" encompasses all frequencies from 10 MHz to 10 THz. This Special Issue will treat recent progress in microwave photonics including experimental studies, theoretical investigations, numerical modeling, and applications. Topics to be covered include, but are not limited to:

1) Devices, Components and Sub-systems
   - High-speed, wideband and linear photonic devices & optically controlled microwave devices
   - Integration and packaging of photonic and microwave components and circuits
   - Microwave bandwidth optical transmitter, receiver, and signal processing subsystems

2) Techniques and Links
   - Photonic generation, distribution, sensing, detection, processing, filtering, and control of microwave signals
   - High-speed photonic analog-to-digital and digital-to-analog conversion
   - Analog, digital and subcarrier multiplexed microwave photonic links
   - Optical frequency metrology and control

3) Systems and Applications
   - Photonic technology for phased array antenna systems and antenna remoting
   - Broadband wireless over fiber systems and networks
   - Ultra-fast optical probing, imaging, and measurements
   - Technologies for emerging applications (biomedical, ultrawideband, terahertz, quantum communications, etc.)

The deadline for submission of manuscripts is January 1st, 2010 and publication is scheduled for the November 2010 issue.
Authors may contact Dalma Novak {d.novak@ieee.org} for more information. Instructions for submission of papers can be found at http://www.mtt.org/publications/Transactions/transactions.htm. In addition, authors must add "(T-MTT/JLT Special Issue)" to the subject line of the e-mail submission.

Guest Editors:

- Prof. José Capmany
  Universidad Politécnica de Valencia
- Prof. Ampalavanapillai Nirmalathas
  The University of Melbourne
- Dr Dalma Novak
  Pharad, LLC

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Photonics Society Mission Statement

Photonics Society shall advance the interests of its members and the laser, optoelectronics, and photonics professional community by:

- providing opportunities for information exchange, continuing education, and professional growth;
- publishing journals, sponsoring conferences, and supporting local chapter and student activities;
- formally recognizing the professional contributions of members;
- representing the laser, optoelectronics, and photonics community and serving as its advocate within the IEEE, the broader scientific and technical community, and society at large.

Photonics Society Field of Interest

The Field of Interest of the Society shall be lasers, optical devices, optical fibers, and associated lightwave technology and their applications in systems and subsystems in which quantum electronic devices are key elements. The Society is concerned with the research, development, design, manufacture, and applications of materials, devices and systems, and with the various scientific and technological activities which contribute to the useful expansion of the field of quantum electronics and applications.

The Society shall aid in promoting close cooperation with other IEEE groups and societies in the form of joint publications, sponsorship of meetings, and other forms of information exchange. Appropriate cooperative efforts will also be undertaken with non-IEEE societies.

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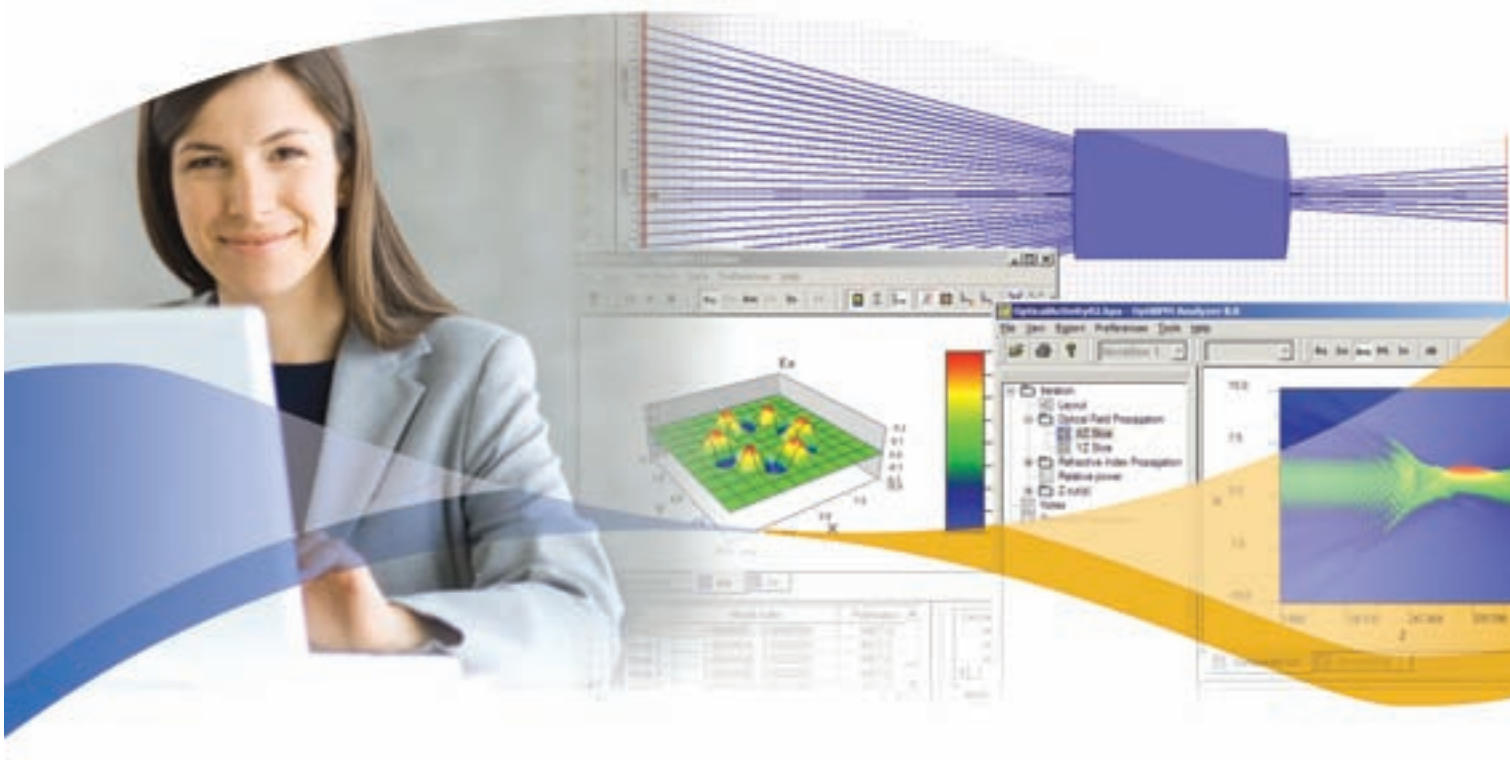

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Alternatively, the controller can automatically adjust and maintain the input SOP using the feedback from the rear polarimeter to either minimize or maximize the output DOP for each PMD setting. Minimizing the output DOP enables testing of the worst-case total PMD effect, while maximizing the DOP turns the PMDPro™ into a PMD compensator, allowing the user to estimate the PMD values of an active fiber link and compare its performance with and without PMD compensation.. PMDPro™ can also perform PMD emulation by generating statistical PMD distributions. Finally, the polarization controller and polarimeters enable variable rate polarization scrambling and deterministic polarization control functions, including trace generation and polarization stabilization at any SOP. PMDPro™ makes your PMD related systems testing simple, fast and professional.

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- Automatic polarization alignment
- Polarization scrambling
- PMD compensation
- PMD determination for live fiber links
- Rapid PMD switching: ~ 1 ms

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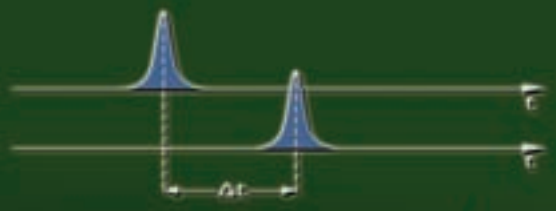
- PMD measurement instrument calibration



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