PHOTONICS® SPECTRA

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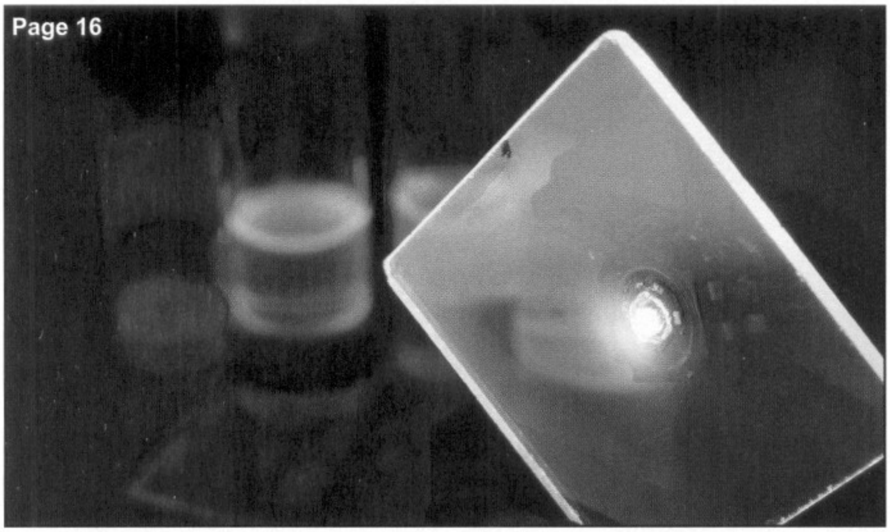
NEWS & ANALYSIS



Page 16

16 Photonics Technology News
LED-pumped polymer laser emits at 568 nm
Fabricating photonic quantum circuits in silicon
An LCD built with graphene
High-speed nanoimprinting gets on a roll
Defect-free structures may pave the way to GaAs lasers

24 Accent on Applications
Fluorescence tracks down hidden bacteria
Tokyo firm puts detectors to work in healing sick building syndrome

30 Photonics BusinessWorld
Future lighting competition
3-D trend in TV and movies
Axsys receives $13.5 million order
Snake Creek Lasers, Alps Electric to partner
Areté, RPMC Lasers sign agreement
AmberWave acquires Aonex Technologies
Optomec, Manz to partner
Team to develop solar cells
BAE licenses patents to Tannas
INO signs technology transfer agreement
Sony and 3M sign license agreement
Gyrocam Systems secures defense contract
Photonics society formed in Poland
Government awards GeoEye $22 million
Axsun Technologies, Lantis Laser sign pact

36 Insights & Enterprise
by Dr. Milton M.T. Chang
Meeting challenges, taking risks

84 Photonics Research
Parabolic reflector couples between fiber and silicon-on-insulator waveguide
Mode-matching technique may enable broad telecom bandwidths
Multimode fiber laser generates single-mode output

DEPARTMENTS

Editorial Comment 10
Letters to the Editor 12
Presstime Bulletin 14
Resource Guide
  Calendar 94
  New Media 98
Innovative Products 104
Advertiser Index 122
Peregrinations 124
  Supercomputing may require bugs
  An open letter to Google

The Cover

For many people, LED technology has the potential to lower energy consumption worldwide. See the series of articles beginning on page 70.

SUBSCRIPTION POLICY

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PHOTONICS:
The technology of generating and harnessing light and other forms of radiant energy whose quantum unit is the photon. The range of applications of photonics extends from energy generation to detection to communications and information processing.

FEATURES

70 On the Road to Energy Savings, LEDs Lead the Way
LEDs may help with global energy-conservation efforts, but there are technical challenges, too.

71 Color Quality and Spectra
by Dr. Yoshi Ohno and Dr. Wendy Davis, National Institute of Standards and Technology
Successful commercialization of LED products for general illumination will depend on a number of factors, such as cost, lifetime, intensity, luminous efficacy and color quality.

73 Measuring LED Junction Temperature
by Jeff Hulett, Vektrex Electronic Systems Inc., and Chris Kelly, Agilent Technologies Inc.
In situ tests are conducted using a bench digital multimeter and a fast-pulsed current source.

76 Polariton LEDs Deliver Quantum Efficiency
by Dr. Pavlos Savvidis, University of Crete
Quasiparticles used to produce LEDs based on standard GaAs technology operate at near-room temperature and may find use in ultraefficient lighting applications, quantum computing and more.

78 LEDs in the Greenhouse
by Anne L. Fischer, Senior Editor
Studies in phytophotonics involve manipulating the light spectrum for improved plant production.

39 Putting the Whole Experiment in an Enclosure
by Ken Barat, Lawrence Berkeley National Laboratory
The enclosure is an important part of laser safety.

42 New Technologies Power New Eyes on the Sky
by Hank Hogan, Contributing Editor
Photonics technologies are advancing telescopes both on Earth and in space.

50 The Expanding Role of Lidar at NASA
by Dr. Farzin Amzajerdian, NASA Langley Research Center
Laser systems are proving invaluable for monitoring the terrestrial environment and for exploring the solar system.

64 Building a Pocket-Size Electron Accelerator
by Dr. Robert L. Byer and Dr. Tomas Plettner, Stanford University
Laser-based particle accelerators are the next grand challenge for laser technology.

80 Vision Sensors Hit the Road
by Hank Hogan, Contributing Editor
Machine vision aids automobile and traffic applications.

89 Nanophotonics
Building quantum dots slowly

90 Microscopy Focus
Determining the composition of quantum dots from top to bottom
Confocal microscopy enables direct observation of photonic nanojets

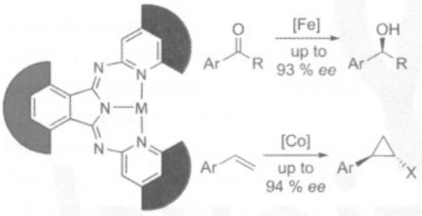
92 Spectroscopy Focus
Raman spectroscopy detects first signs of tooth decay

57 Meeting the Solar Challenge
In the conclusion of our two-part series, we examine obstacles to solar power.

58 Is Solar Thermal Power the Answer?
by Charles Ricker, BrightSource Energy Inc.
Solar energy may be abundant, clean and nondepleting, but capture and distribution continue to be the main challenges.

60 Popcorn-Style Solar Cells
by Guozhong Cao, University of Washington
Researchers turn to zinc oxide as an alternative low-cost, high-efficiency material for dye-sensitized solar cells.

62 Solar Up, Silicon Down
by Anne L. Fischer, Senior Editor
A recent study examines changes in manufacturing, business partnering, technology advancement and government incentives for the photovoltaics industry.



Protect your back: Chiral wedges (red, see scheme) at the wingtips of bis(2-pyridylimino)isoindole (bpi) pincer ligands with an appropriate protective hedge (green), to block the metal center from backside attack, in the backbone represent a new class of efficient 3d-metal catalysts. These catalysts gave excellent enantioselectivities in the iron-catalyzed hydrosilylation of arylketones and in the cobalt-catalyzed cyclopropanation of alkenes.

Asymmetric Catalysis

B. K. Langlotz, H. Wadepohl,
L. H. Gade* ____________ **4670–4674**

Chiral Bis(pyridylimino)isoindoles: A Highly Modular Class of Pincer Ligands for Enantioselective Catalysis

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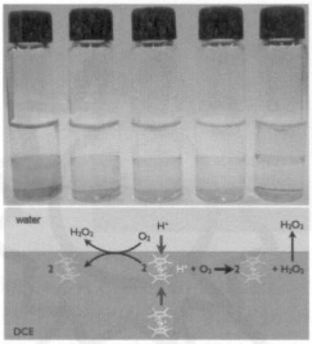

Hydrogen peroxide generation at a liquid | liquid interface occurs with a yield of 20% with respect to the concentration of reducing agent (decamethylferrocene). The liquid | liquid interface supplies electrons from the reducing agent and protons from the aqueous phase to drive the reduction of O_2 into H_2O_2, which is extracted into the aqueous phase during the course of reaction (see picture; DCE = 1,2-dichloroethane).

Hydrogen Peroxide Production

B. Su, R. P. Nia, F. Li, M. Hojeij,
M. Prudent, C. Corminboeuf, Z. Samec,
H. H. Girault* ____________ **4675–4678**

H_2O_2 Generation by Decamethylferrocene at a Liquid | Liquid Interface

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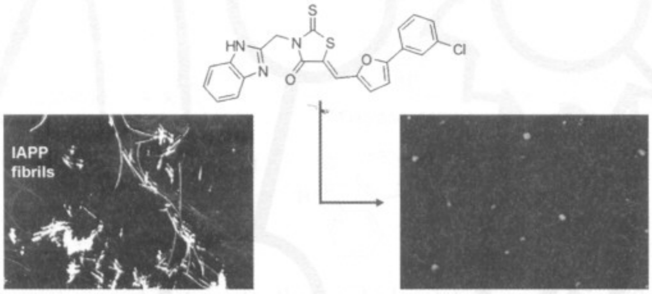

Small and effective: The pathological aggregation of amylin (IAPP), which leads to type II diabetes mellitus, is effectively inhibited by small-molecule rhodanine-based inhibitors at nanomolar concentrations. The prevention of aggregation by treatment with the inhibitor is demonstrated by AFM (see image).

Small-Molecule Inhibitors

R. Mishra, B. Bulic, D. Sellin, S. Jha,
H. Waldmann, R. Winter* __ **4679–4682**

Small-Molecule Inhibitors of Islet Amyloid Polypeptide Fibril Formation

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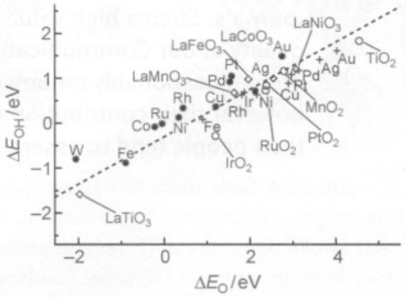
Getting on top of things: DFT calculations have been used to study the adsorption energies of O, OH, S, SH, N, NH, and NH_2 on transition metal oxide, sulfide, and nitride surfaces. A scaling relationship was found between the adsorption energies of the intermediates and the adsorption energies of the atoms which is independent of the metal and depends only on the number of H atoms in the molecule (see graph).



Surface Adsorption

E. M. Fernández, P. G. Moses,
A. Toftelund, H. A. Hansen, J. I. Martínez,
F. Abild-Pedersen, J. Kleis, B. Hinnemann,
J. Rossmeisl, T. Bligaard,
J. K. Nørskov* ____________ **4683–4686**

Scaling Relationships for Adsorption Energies on Transition Metal Oxide, Sulfide, and Nitride Surfaces