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Platinum Dye Used in Electroluminescent Devices

Electroluminescent devices (LEDs) convert electricity to light and are increasingly used in, for example, flat-panel displays. They are usually made by sandwiching a layer of semiconductor between one electrode with a high work function (a source of holes) and an electrode with a low work function (an electron source). In the presence of an applied electric field an electron-hole exciton is formed (both singlet and triplet states) and the radiative recombination of the (singlet) exciton generates a photon that re-appears as visible light emitted from the device.

The current trend is towards the development of polymeric electroluminescent material because of the processing advantages. There is also a need to improve the overall energy conversion efficiency of LEDs, which is typically of the order of 1 per cent. One approach to the latter problem has been to introduce luminescent dyes into the host semiconductor material. Provided that the absorption spectrum of the dye overlaps well with the emission spectrum of the host material, efficient energy-transfer from the host to the dye can occur. However, only the singlet exciton states (approximately 25 per cent of the total) can be used in the additional fluorescent emission.

Now, workers from Princeton University and the University of Southern California have demonstrated improved light emission efficiencies by using a phosphorescent dye in the semiconductor host (M. A. Baldo, D. F. O'Brien, Y. You, A. Shoustikov, S. Sibley, M. E. Thompson and S. R. Forrest, "Highly Efficient Phosphorescent Emission from Organic Electroluminescent Devices", *Nature*, 1998, **395**, (6698), 151–154). The phosphorescent dye, 2,3,7,8,12,13,17,18-octaethyl-21H,23H-porphine platinum(II) (PtOEP), enables both singlet and triplet exciton states to be used in the light-emission process, and external energy conversion efficiencies of up to 4 per cent have been achieved.

PtOEP is relatively well-known as a red-emitting phosphorescent dye and in comparison with other compounds with saturated red-emission, PtOEP possesses quantum and power efficiencies that are superior by at least an order of magnitude. The presence of the heavy platinum atom in the porphine ring increases the spin-orbit coupling of the molecule, the triplet state gains additional singlet character and vice versa. This also enhances the efficiency of intersystem crossing from the first singlet excited state to the triplet excited state. Thus the enhanced phosphorescent light emission from the PtOEP adds significantly to the overall light-emitting process in the LED. The work also establishes the utility of PtOEP as a probe of triplet behaviour and energy-transfer in organic solid-state systems.

R. J. POTTER

International Symposium on Iridium

There will be an International Symposium on Iridium held at the Annual Meeting of The Minerals, Metals and Materials Society (TMS) in Nashville, Tennessee, U.S.A., from March 11th to 17th, 2000.

The symposium will address all aspects of the metallurgy, production, and applications for iridium and iridium-containing materials. Particular attention will be given to refining and recycling; processing iridium compounds; the processing, structure, and properties of iridium and its alloys; iridium coating technology; component design and applications and iridium as an alloying element in metallic and intermetallic systems. It is anticipated that the proceedings of the symposium will be published.

Evan Ohriner of Oak Ridge National Laboratory is the Primary Organiser of the Symposium; H. Harada, National Research Institute for Metals, Japan; R. D. Lanam, Engelhard-CLAL, U.S.A. and P. Panfilov, Ural State University, Ekaterinburg, Russia are the co-organisers.

Abstracts of papers should be submitted by June 15th 1999 to http://www.tms.org/cms., or contact the Primary Organiser: E. K. Ohriner, Oak Ridge National Laboratory, P.O. Box 2008, MS 6083, Bldg. 4508, Oak Ridge, TN 37831-6083, U.S.A.; telephone: +1-(423)-574-8519; fax: +1-(423) 574-4357; e-mail: ohrinerek@ornl.gov.