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Spectroscopy Letters

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713597299>

Editorial

Peter A. Tanner

Online publication date: 30 July 2010

To cite this Article Tanner, Peter A.(2010) 'Editorial', *Spectroscopy Letters*, 43: 5, 317 — 318

To link to this Article: DOI: 10.1080/00387010.2010.505847

URL: <http://dx.doi.org/10.1080/00387010.2010.505847>

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Editorial

This special issue of *Spectroscopy Letters* is titled *Spectroscopy of Lanthanide Materials II*, and contains 14 papers, which follow after special issue *I*, which comprised 11 papers. Similar to the first edition, the focus herein is mainly upon the electronic spectroscopy of $4f^N - 4f^N$ and $4f^N - 4f^{N-1}$ 5d transitions of lanthanide ions. There is a good mix of experiment and theory in the present issue.

Some theoretical works in this edition have concerned trivalent lanthanide ions, Ln^{3+} in crystals. Burdick et al. have fitted the $4f^{11}$ energy levels of Er^{3+} in $Y_3Al_5O_{12}$ (YAG) and simulated the intraconfigurational absorption line strengths over a wide spectral range. The interconfigurational line strengths of this ion have been the focus of Duan and Jiang, who employed the simple model for comparison with experimental data. The above studies concerned single ions and the presence of major spectral features. Lupei et al. explained the presence of weak spectral satellite features due to the interaction between Ln^{3+} ions in garnet, sesquioxide and other types of crystals. Turning to the divalent ions, Ln^{2+} , Sánchez-Sanz et al. rationalized the energy shift of the $4f^{13}$ 6s levels of Yb^{2+} when going from an isolated gas phase ion to that in the $CsCaBr_3$ crystal, by using *ab initio* methods.

Other papers have comprised a blend of theory and experiment. The synchrotron radiation excited emission and excitation spectra of lanthanide hexachloroelpasolites were presented by our group, with simulations of the f – d absorption spectra. Capelletti et al. have investigated the high resolution optical spectra of $YPO_4:Ho^{3+}$ single crystals and simulated the $4f^{10}$ energy level scheme of Ho^{3+} in this crystal. The synthesis and optical properties of Eu^{3+} ion doped nanocrystalline hydroxyapatites have been reported by Wiglusz et al. in the group of Prof. Strek, together with a Judd-Ofelt intensity analysis. The effect of calcination temperatures upon grain size and luminescence properties has also been included.

Other papers have been of a more synthetic or experimental nature. Nobre et al. in Prof. Carlos group described the spectra and dynamics of lanthanide-containing 2,2-bipyridine bridged urea cross-linked polysilsesquioxanes. These hybrids feature both the emission of the host and the Eu^{3+} and/or Tb^{3+} transitions, thereby allowing a fine-tuning of the colour from the blue to the red, orange or green spectral regions. Pan and Liu have shown that Eu^{2+} displays a luminescence intensity enhancement in $BaO-SiO_2$ compounds through composition modification by doping with ZnO . Liu et al. have presented the optical spectra of Sm^{3+} and Dy^{3+} -doped

ZnO nanocrystals and identified host to guest energy transfer. Photothermal effects have been identified in the near-infrared excited emission spectra of $\text{Ca}_4\text{NdO}(\text{BO}_3)_3:\text{Yb}^{3+}$ single crystals by Świrkowicz et al. An increase of the Nd^{3+} luminescence intensity was observed by $\text{Yb}^{3+} \rightarrow \text{Nd}^{3+}$ energy transfer, enhanced by thermal heating by the pulsed Nd:YAG laser.

Finally, three studies of a more applied nature are included. Aarts et al. have considered the possibility of enhancing solar cell performance by using downconversion in $\text{YF}_3:\text{Yb}^{3+}, \text{Pr}^{3+}$. Mikhailik and Kraus conducted a feasibility study of the vacuum ultraviolet sensitisation effect of Tb^{3+} upon Eu^{3+} or Mn^{2+} , in order to give visible emission from a noble gas discharge. Wang et al. produced tunable emission colors from monodisperse $\beta\text{-NaYF}_4$ nanoparticles by upconversion with a near infrared laser diode. The nanoparticles were triply-doped with lanthanide ions and could be dispersed in organic solvents, or by silica coating, in more polar solvents.

These 14 papers illustrate some of the diverse aspects of lanthanide spectroscopy that are presently being studied and exemplify how vibrant this research area is. A Scopus search of the period 2004–2009 with the keywords *spectr** and *lanthan** shows that for each year about 2000 papers have been published in SCI journals.

When I sent out the invitations to authors to contribute a manuscript to this Special Edition, the first author who agreed to submit a paper was Dr. Olivier Guillot-Noël. Very sadly and tragically, he was taken away from us by the Air France crash when he was returning with a colleague from Brazil. I met Olivier at Conferences on two occasions. I was very impressed by his knowledge and vitality. The authors of this Special Edition agreed to dedicate it in his memory, and Prof. Philippe Goldner has kindly added some further words in his remembrance.

Peter A. Tanner
November 2009