17th INTERNATIONAL KRUTYN SUMMER SCHOOL 2015 – TENTATIVE SCIENTIFIC PROGRAM

THEORETICAL BACKGROUND

Prof. Oscar L. Malta, Universidade Federal de Pernambuco, Brazil

1. Fermi's Golden Rule and the theory of 4f-4f transition intensities.
2. Fermi's Golden Rule and non-radiative energy transfer involving lanthanide ions.

Prof. Cees Ronda, Philips, The Netherlands

3. Absorption and emission mechanisms, d-d, d-f and f-f transitions, donor-acceptor pair luminescence, self-activated luminescence, luminescence quenching mechanisms
4. Introduction to group theory, derivation of selection rules

Prof. Ricardo L. Longo, Universidade Federal de Pernambuco, Brazil

5. Rate equations: connection between macroscopic/experimental and microscopic descriptions, examples and applications to quantum yield, emission intensity, emission lifetime, population dynamics
6. Electronic structure methods applied to lanthanide complexes: background, calculations, and applications to molecular structure, fluxionality, reactions, and photophysics.

Prof. Luís Dias Carlos, Universidade de Aveiro, Portugal

7.1 Emission lifetime of excited 4f states: definition when energy transfer processes are present.

7.2 Relation between the quantum efficiency of an excited state and the emission quantum yield.

7.3 Dependence of the emission lifetime with the excitation wavelength. Examples.

This lecture must be connected with that of Ricardo Longo that will present theoretical models for that dependence.

Prof. Sidney Ribeiro, São Paulo State University- UNESP, Brazil

8. Materials for Photonics and Lanthanides- Historical background, past and future.

Atomic spectra, wavefunctions, energy levels, crystal field ff transitions, radiative and non-radiative transition

9. Energy transfer

Ligand field, ff intensities, Coordination compounds and Down-shifting, Down-conversion and Up-conversion

Prof. Dr. Markus Pollanu, School of Information and Communication Technology, Sweden

10. Radiative decay time and emission cross section: The Füchtbauer-Ladenburg equation

Prof. Jean-Claude G. Bünzli, Swiss Federal Institute of Technology Lausanne, Switzerland

11. Designing highly luminescent lanthanide complexes

11.1. Stating the problem

11.2. Optimization of energy transfer

11.3. Minimizing radiationless de-activation processes

11.4. Tuning the radiative lifetime

11.5. Examples of highly luminescent complexes and materials

ACADEMIC RESEARCH

Prof. Cid B. de Araújo, Universidade Federal de Pernambuco, Brazil

12. Stokes and anti-Stokes luminescence in the presence of metallic nanoparticles.
13. Nonlinear luminescence in colloids and nanostructured solids (including Random Lasers).

Prof. John Capobianco, Concordia University, Canada

14.The Fluoride Host: Nucleation, Growth and Upconversion of Lanthanide-Doped Nanoparticles.

Prof. Wieslaw Strek, Institute of Low Temperatures & Structural Research, PAS, Poland

15. Anti-Stokes white emission in RE systems.
16. Size effects in spectroscopy of RE nanocrystals

Prof. Luís Dias Carlos, Universidade de Aveiro, Portugal

17. & 18. Luminescent nanothermometry. Nanothermometers and nanoheaters get closer.

17. & 18.1 Luminescence thermometry involving one emitting center and two emitting centers 17. & 18.2 Examples involving Ln^{3+}-based magnetic NPs, organic-inorganic hybrids, silicates, metal organic frameworks and UCNPs 17. & 18.3 Applications in microfluidic, microelectronics and integrated optics 17. & 18.4 Nanothermometers and nanoheaters playing together. Hyperthermia.
APPLICATIONS & TECHNOLOGY
Prof. John Capobianco, Concordia University, Canada 19. Near Infrared Light Mediated Drug Release, Photodynamic Therapy and Bioimaging Using Upconversion Nanoparticles
Prof. Cees Ronda, Philips, The Netherlands 20. Applications, with emphasis on scintillators
Prof. Jean-Claude G. Bünzli, Swiss Federal Institute of Technology Lausanne, Switzerland ***21. Bioimaging with luminescent lanthanide probes*** 21.1. Luminescence microscopy 21.2 Time-resolved luminescence microscopy 21.3. Probes based on complexes 21.4. Microfluidic devices 21.5. Probes based on UCNPs
Prof. Rute A.S. Ferreira, University of Aveiro, Portugal 22. Photonics-enabled devices for lighting, energy and optical communications based on organic-inorganic hybrids 23. Organic-inorganic hybrid materials lacking metal activator centers for solid state lighting. 24. Lanthanide-based organic-inorganic hybrid materials for flexible wave guiding photovoltaics
Prof. Sidney Ribeiro, São Paulo State University- UNESP, Brazil 25. Down-shifting- Luminophors, Imaging, sensors, Optical Amplification in integrated optics, Persistent Luminescence. Down-conversion- Energy conversion in photovoltaics. Up-conversion- Infrared activated photoprocesses.
Dr Patricia Haro González, Universidad Autónoma de Madrid, Spain 26. Nanoparticles for photothermal therapies 27. Fluorescent nanoparticles for sensing aplications
Prof. Dr. Ulrich Kynast, University of Applied Sciences, Münster, Germany Luminescent nanoparticles and nanocomposites 28. Luminescence from nanosized pores 29. Luminescence from nanosized gaps
Prof. Dr. Markus Pollanu, School of Information and Communication Technology, Sweden 30. An efficient rare-earth-doped waveguide amplifier 31. A rare-earth-doped narrow-linewidth laser