

Lanthanide-Doped Luminescent Nanoprobes: Electronic Structure, Optical Properties and Bioapplications

Xueyuan Chen*, Wei Zheng, Datao Tu, Yongsheng Liu, and Qiang Ju
Key Laboratory of Optoelectronic Materials Chemistry and Physics, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, Fujian 350002

E-mail: xchen@fjirsm.ac.cn

Lanthanide-doped inorganic nanoparticles possess superior physicochemical features such as long-lived luminescence, large antenna-generated Stokes or anti-Stokes shifts, narrow emission bands, high resistance to photobleaching and low toxicity, and thus are regarded as a new generation of luminescent bioprobes as compared to conventional molecular probes like organic dyes and lanthanide chelates. These functional nanoparticles, albeit most of their bulk counterparts were well studied previously, have attracted reviving interest for their biomedical applications in areas as diverse as biodetection, bioimaging, and disease diagnosis and therapeutics. In this talk, we shall focus on the latest advances made in developing lanthanide-doped inorganic nanoparticles as potential luminescent bioprobes, which cover from their chemical and physical fundamentals to bioapplications including the controlled synthesis, surface modification, electronic structure, optical properties, and their promising applications in diverse fields, with an emphasis on heterogeneous and homogeneous *in-vitro* biodetection of tumor markers and multimodal bioimaging of various tumor tissues [1-8].

References

- [1] **Xueyuan Chen**, Yongsheng Liu, and Datao Tu, *Lanthanide-Doped Luminescent Nanomaterials: From Fundamentals to Bioapplications*, Springer-Verlag Berlin Heidelberg, 2013
- [2] Yongsheng Liu, Datao Tu, Haomiao Zhu, and **Xueyuan Chen***, *Chem. Soc. Rev.* **2013**, 42, 6924
- [3] Wei Zheng, Shanyong Zhou, Zhuo Chen, Ping Hu, Yongsheng Liu, Datao Tu, Haomiao Zhu, Renfu Li, Mingdong Huang, and **Xueyuan Chen***, *Angew. Chem. Int. Ed.* **2013**, 52, 6671
- [4] Datao Tu, Yongsheng Liu, Haomiao Zhu, Renfu Li, Liqin Liu, and **Xueyuan Chen***, *Angew. Chem. Int. Ed.* **2013**, 52, 1128
- [5] Y.S. Liu, S.Y. Zhou, D.T. Tu, Z. Chen, M.D. Huang, H.Z. Zhu, E. Ma, and X.Y. Chen*, *J. Am. Chem. Soc.*, **2012**, 134, 15083.
- [6] Qiang Ju, Datao Tu, Yongsheng Liu, Renfu Li, Haomiao Zhu, Jincan Chen, Zhuo Chen, Mingdong Huang, Xueyuan Chen*, *J. Am. Chem. Soc.*, **2012**, 134, 1323
- [7] D. T. Tu, L. Q. Liu, Q. Ju, Y. S. Liu, H. M. Zhu, R. F. Li and X. Y. Chen*, *Angew. Chem. Int. Ed.* **2011**, 50, 6306.
- [8] Y. S. Liu, D. T. Tu, H. M. Zhu, R. F. Li, W. Q. Luo, and X. Y. Chen*, *Adv. Mater.*, *Adv. Mater.* **2010**, 22, 3266.