报告六：Scandium-Based Luminescent Nanomaterials

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Abstract

In the past decades, rare earth-based upconversion luminescent nanomaterials have drawn greatly increased interest due to their superior optical properties including but not limited to narrow emission bandwidth, large anti-Stokes shifts, high photostability, weak autofluorescence from biosamples, long life-time, deep tissue penetration, and low cytotoxicity.

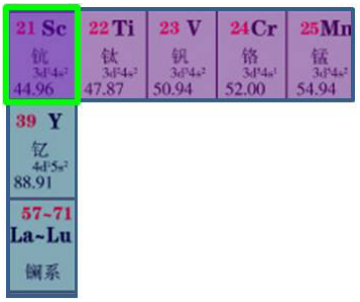

Fig. 1. Position of Sc in the periodic table.

However, majority of the energy have been focused on Y- and lanthanide-based nanomaterials while there is quite few attention has been paid on Scandium-based nanomaterials while on the other side, Sc sits at a very unique position in the periodic table, i.e., the cross junction between the top of the rare earth column and the beginning of the transition metal row, has imparted unique chemical and physical properties to Sc and its compounds. Indeed, our studies have shown that, t not only the chemical compositions and the according crystal structures of Na_xScF_{3+x} are very sensitive to the synthesis experimental conditions, they also emit strong red upconversion luminescence, different from those of the hexagonal phase nanomaterials of Y- and lanthanide-based fluorides, which usually generate strong green upconversion luminescence.

Herein, based on our previous studies, we will summarize our advances on Sc-based luminescent nanomaterials and their potential applications.[1-6]

References

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Brief Introduction

Dr. Ling HUANG received his Ph.D. degree in Chemistry from Nanjing University in 2001. He then pursued post-doctoral research at the University of California, Berkeley (Gabor A. Somorjai), Florida State University (Seunghun Hong), and Northwestern University (Chad A. Mirkin). After that, he worked as a senior research scientist at the Biochemical Division of Corning Incorporated in 2008 and then joined Nanyang Technological University in Singapore as an associate professor since 2009. Starting from August of 2012, Dr. Huang worked as a professor and deputy director of the Institute of Advanced Materials (IAM), at Nanjing Tech University, China. His current research focuses on design, synthesis, and tuning of the optical properties of lanthanide-doped nanocrystals and their related nanocomposites. He has published over 80 scientific research articles in Nature, Science, J. Am. Chem. Soc., Small, Nanoscale and so on, with a total citation of more than 2300 times.