

### 16th Iranian Inorganic Chemistry Conference

#### Bu-Ali Sina University, Hamedan, Iran

**27-29 August** 



# Synthesis and characterization of a new lanthanum complex and preparation of lanthanum oxide nanoparticles

## <u>Fahimeh Shafaie Najafabadi,</u> Mohammad Taghi Behnamfar, Marzieh Daryanavard, Fatemeh Davar, Hassan Hadadzadeh\*

Department of Chemistry, Isfahan University of Technology, Isfahan 84156-83111, Iran (e-mail: hadad@cc.iut.ac.ir)

Lanthanides are an attractive class of elements and have unique optical, catalytic and magnetic properties as a consequence of their unique 4f electrons configuration. Among various lanthanumbased materials, lanthanum oxide (La<sub>2</sub>O<sub>3</sub>) is a great research interest due to its technological applications [1-6]. In our study, a new lanthanum methyl orange  $[La(L)_3(DMF)_3(H_2O)_3],$ L = 4-[(4-dimethylamino)phenyldiazenyl]benzenesulfonate, synthesized via the reaction of methyl orange with lanthanum(III) nitrate hexahydrate in the aqueous solution. Diffusion of ether into a DMF solution of the complex gave the red crystals suitable for X-ray crystallography. Then the lanthanum oxide nanoparticles were prepared by the various methods such as calcination and hydrothermal methods from the new lanthanum complex as the precursor. La<sub>2</sub>O<sub>3</sub> nanoparticles were prepared by the calcinated La complex precipitate in air at different temperatures up to 950 °C for 2 h. The calcination temperature was the key parameter which was changed for more investigation. The products were characterized by X-ray crystallography, elemental analysis, X-ray diffraction (XRD), FE-SEM, luminescence, FT-IR and UV-Vis spectroscopies.

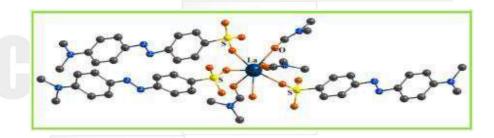


Fig. 1. The molecular structure of ([La(L)<sub>3</sub>(DMF)<sub>3</sub>(H<sub>2</sub>O)<sub>2</sub>]. The hydrogen atoms are omitted for more clarity

#### **References:**

- [1] P.C. Chen, C.H. Chen, C.M. Tsai, C.F. Cheng, S.L. Wu, Surface and Coatings Technology 231 (2013) 328-331.
- [2] B. Ersoy, V. Gunay, Ceramics International 30 (2004) 163–170.
- [3] W. He, S. Schuetz, R. Solanki, J. Belot, J.M. Andrew, *Electrochemical Solid-State Letter* 7 (2004) G131–G133.
- [4] W. Chen, Z. Kang, B. Ding, Materials Letters 59 (2005) 1138–1141.
- [5] M. Mori, Y. Hiei, T. Yamamoto, H. Itoh, Journal of the Electrochemical Society 146 (1999) 4041–4047.
- [6] J. Yoo, J. Hong, H. Lee, Y. Jeong, B. Lee, H. Song, J. Kwon, Sensors and Actuators A: Physical 126 (2006) 41–47.