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The Institution has several collaborations/linkages for Faculty exchange, Student exchange, Internship, Field trip, On-the- job training, research etc. during the year

Research Collaboration

28. Dr. Jayantha K. Nath, Assistant Professor, Department of Chemistry, S. B. Deorah College, has Research Collaboration with Dr. Ritupan Borah, Professor, Dept of Physics, Indian Institute of Technology, Guwahati.

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REGULAR ARTICLE

A lanthanide cluster formed by fixing atmospheric CO_2 to carbonate: a molecular magnetic refrigerant and photoluminescent material

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Abstract. A lanthanide carboxylates cluster derived from 1,8-naphthalene dicarboxylate (NDC= 1,8 naphthalene dicarboxylate) and 1,10-phenanthroline (Phen) has been synthesized. The cluster of Sm(III) has been utilized for luminescence and magnetic refrigeration properties. Most interestingly, the auto immobilization of atmospheric carbon dioxide forms carbonate ion which acts as a bridging ligand and is positioned at the middle of the cluster. This cluster is characterized by different spectroscopic tools like FT-IR, photoluminescence spectrum, and the molecular structure $[Sm_4(NDC)_5(Phen)_4(\mu_4\text{-}CO_3)(H_2O)_3].3H_2O.CH_3OH$ (**1**) is determined by single crystals X-ray diffraction. π-conjugated ligand (NDC=1,8-Naphthalene dicarboxylate; Phen=phenanthroline) affects both absorption and photoluminescence intensity. Moreover, from the $\chi_m T$ vs temperature plot, it is observed that there is an occurrence of antiferromagnetic interaction among the Sm^{III} centers. The cluster possesses high magnetocaloric value at low temperature which offers itself as a potential candidate for cryogenic molecular magnetic refrigerant material. In addition, thermogravimetric analysis, Hirsh field surface area analysis, and the optical diffuse reflectance spectrum of this cluster is also described.

Keywords. Cluster; CO_2 capture; structural studies; photoluminescence; magnetic refrigerant; Hirsh field.

1. Introduction

The emission of carbon dioxide from various sources is well established to be the sole factor of global warming.[1] To fix these issues, the conversion of CO_2 into value-added chemicals or functional molecular materials is a green pathway to turn waste into treasociated with magnetism,[16–19] electroluminescent devices, and laser systems.[20]

Among them, research on discovering new magnetic materials having a magnetocaloric effect (MCE) for magnetic cooling applications become an emerging field of research.[21] High-efficiency magnetic refrigeration using holmium was reported by Noriki *et al.*[22]