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New NIR-emissive tetranuclear Er(III) complexes with 4-hydroxo-2,1,3-benzothiadiazolate and dibenzoylmethanide ligands: Synthesis and characterization

Sukhikh T., Bashirov D., Kuratieva N., Smolentsev A., Bogomyakov A., Burilov V., Mustafina A., Zibarev A., Konchenko S.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The Royal Society of Chemistry 2015. New tetranuclear heteroleptic complexes [Er4(dbm)6(O-btd)4(OH)2] (1) and [Er4(dbm)4(O-btd)6(OH)2] (2) (O-btd = 4-hydroxo-2,1-3-benzothiadiazolate and dbm = dibenzoylmethanide) and their solvates with toluene, THF and CH2Cl2 were prepared using two synthetic approaches. The structures of the products were confirmed by single-crystal X-ray diffraction. Magnetic properties of 1 and 2 are in good agreement with X-ray data. The effective magnetic moment (μeff) values at 300 K for 1 and 2 corresponds to a system of 4 non-interacting Er(iii) ions in the ground state 4J15/2 with g = 6/5. At ambient temperature and upon excitation with λexc = 450 nm, complexes 1 and 2 exhibit luminescence at ~1530 nm, i.e. in the near infra-red (NIR) region. The luminescence intensity grows with increasing the number of the (O-btd)- ligands in the complexes. This observation suggests (O-btd)- as a new efficient antenna ligand for the lanthanide-based NIR luminescence.

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