Title:	Fluorescence Enhancement of Tb3+ in the Tb3+-Trimesic Acid-Gd3+ Complex: Role of Polynuclear Structures
Authors:	Dubey, Pankaj (/jspui/browse?type=author&value=Dubey%2C+Pankaj) Mukherjee, Srijit (/jspui/browse?type=author&value=Mukherjee%2C+Srijit) Choudhury, A.R. (/jspui/browse?type=author&value=Choudhury%2C+A.R.) Viswanathan, K.S. (/jspui/browse?type=author&value=Viswanathan%2C+K.S.)
Keywords:	Cofluorescence Lanthanide Dynamic light scattering
Issue Date:	2019
Publisher:	Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim
Citation:	ChemistrySelect, 4(9), pp.2747-2752.
Abstract:	The mechanism of fluorescence enhancement of Tb3+ in Tb3+-trimesic acid-Gd3+ systems has been explored using dynamic light scattering. In earlier work, the mechanism of fluorescence enhancement of Tb3+ in these systems was proposed to be due to the formation of a polynuclear complex involving Tb3+, trimesic acid and Gd3+. However, no direct experimental evidence was presented for the mechanism in that work. In this work, we have used dynamic light scattering (DLS), to measure changes in the mean hydrodynamic diameter (Zavg) of the Tb3+-trimesic acid-Gd3+ complex, as a function of time. The Zavg was found to increase monotonically as a function of time, indicating a continuous growth in the particle size. The Eu3+-β-diketones-Gd3+ system also shows enhancement of Eu3+ fluorescence; though a different mechanism was believed to be operating in this case; namely intermolecular energy transfer. If the two systems followed different mechanisms for fluorescence enhancement, the Eu3+-β-diketones-Gd3+ system, is expected to show a different time evolution of particle size. The DLS study showed that the Zavg increased rapidly to a maximum value and then remained nearly constant throughout our measurements; that is, no gradual increase in Zavg was seen as in the Tb3+-trimesic acid-Gd3+ system. These DLS studies of the Tb3+-trimesic acid-Gd3+ and Eu3+-β-diketones-Gd3+ systems, therefore confirms that different mechanisms of fluorescence enhancement are operative in the two systems.
URI:	https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.201900035 (https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.201900035) http://hdl.handle.net/123456789/2167 (http://hdl.handle.net/123456789/2167)
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