

Preparation and luminescence properties of silica material containing $\text{Eu}(\text{TTA})_3(\text{H}_2\text{O})_2$

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Rare earth ions are generally used as fluorescent probes for analytical application because of their distinguished luminescence characteristics such as narrow spectral width, long luminescence lifetime and large Stokes shift [1]. The luminescent functionalized silica materials have been widely used for bioanalytical assays. These particles are typically generated by incorporating complex into the silica matrix, and the incorporation of Eu^{3+} -complexes into silica particles combines optical characteristics of Eu^{3+} -complexes and properties of inorganic oxides. In this work, we prepared silica particles containing $[\text{Eu}(\text{TTA})_3(\text{H}_2\text{O})_2]$ complex (TTA = 2-thenoyltrifluoroacetone) by modified Stöber method [2]. Determination of amino groups in the material was performed using a method involving ninhydrin. The difference in morphology between Eu^{3+} -complex and luminescent silica material can be attributed to the network of silica on the material surface (Figure 1). Emission spectrum of the luminescent silica particle showed an enlargement of the bands when compared to the complex emission spectrum. No differences in line position were observed. The emission spectra show characteristic ${}^5\text{D}_0 \rightarrow {}^7\text{F}_J$ ($J = 0-4$) transitions of Eu^{3+} , with the hypersensitive ${}^5\text{D}_0 \rightarrow {}^7\text{F}_2$ transition as the most prominent one.

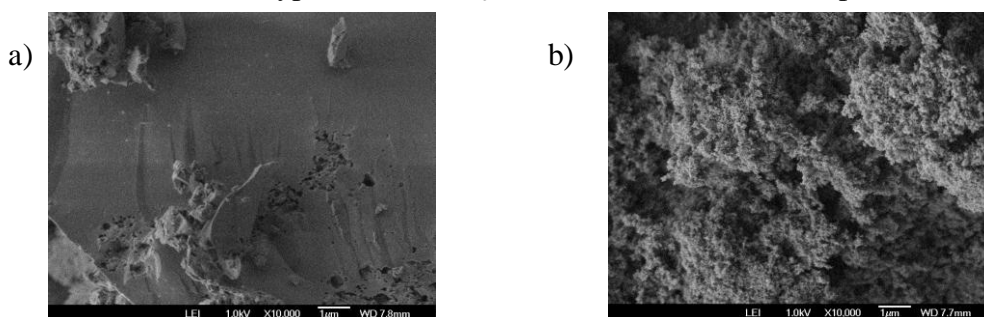


Figure 1 – SEM images of a) $[\text{Eu}(\text{TTA})_3(\text{H}_2\text{O})_2]$ complex and b) silica material containing $[\text{Eu}(\text{TTA})_3(\text{H}_2\text{O})_2]$ complex.

Keywords: Europium, luminescence, complexes, silica, functionalization.

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