

Luminescence recognition material as an INHIBIT logic gate in presence of Pb^{2+} and Cu^{2+} ions in aqueous solutions.

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A recognition material consisting of silica xerogel with amino-modified surface selectively recognizes Pb^{2+} and Cu^{2+} (but only in presence of Pb^{2+} ions) in aqueous solutions of other metal ions. The analytical action of the material is based on a significant change in luminescence emission spectra of the material after chemisorption of Pb^{2+} ions. In the presence of Pb^{2+} in octahedral coordination environment, a new broad and strong emission band appears which is peaking at 443 nm ($\lambda_{\text{exc}} = 236$ nm) ascribed to electronic transition in Pb^{2+} complex. On the other hand, the presence of Cu^{2+} cations causes significant depression of the Pb^{2+} luminescence. The material plays a role of INHIBIT logic gate for both the mentioned cations.

Pb^{2+} can be analyzed quantitatively but Cu^{2+} only qualitatively in presence of Pb^{2+} . The material can be regenerated after chemisorption and is photochemically stable during UV illumination. Besides the surface of the modified silica support is analyzed by SEM and XPS techniques and coordination sphere of the chemisorbed Cu^{2+} ions is determined by electron paramagnetic resonance (EPR).

Słowa kluczowe

luminescence recognition material, Pb^{2+} , Cu^{2+} , Selectivity, logic gate

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