

Spectroscopy, magnetism and non-radiative processes in heteronuclear Cu:Pr squarate; $[\text{Pr}_2\text{Cu}(\text{C}_4\text{O}_4)_4(\text{H}_2\text{O})_{16}] \cdot 2\text{H}_2\text{O}$.

Autorzy

Janina Legendziewicz

Paula Gawryszewska

Joanna Cybińska

G. Oremek

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In the present work, the spectroscopic and magnetic properties of heteronuclear Cu:Pr squarate are reported. Single crystals of $[\text{Pr}_2\text{Cu}(\text{C}_4\text{O}_4)_4(\text{H}_2\text{O})_{16}] \cdot 2\text{H}_2\text{O}$ were obtained by reaction of squaric acid, praseodymium chloride and copper chloride in water solution according to the procedure described earlier. The crystals of title compound are isomorphic with $[\text{La}_2\text{Cu}(\text{C}_4\text{O}_4)_4(\text{H}_2\text{O})_{16}] \cdot 2\text{H}_2\text{O}$ crystal, where squarate anions participate as bridging ligands between metal ions. The UV region of absorption spectra of the title compound is dominated by C–T band of Cu(II), f–d transition of Pr(III) and internal π – π^* ($A_{1g} \rightarrow E_u$) and π – π^* ($A_{1g} \rightarrow E_g$) ligand transitions. In visible and IR regions, t_{2g} – e_g of copper Cu(II) as well as, , , , Pr(III) transitions at 293 and 4 K were recorded. At low temperature splitting given by Jahn–Teller effect can be observed. Significant anisotropy of d–d transitions intensities confirms well the Jahn–Teller effect, too. Unexpectedly high intensity of transition is probably due to the intensity borrowing from the Cu (II) d–d transition. The and emission of Pr(III) in the $[\text{Pr}_2\text{Cu}(\text{C}_4\text{O}_4)_4(\text{H}_2\text{O})_{16}] \cdot 2\text{H}_2\text{O}$ crystals is quenched even at 77 K. Whereas emission of appropriate polynuclear europium squarate was detected. The pathways of excited state quenching by e_g levels of Cu(II), multiphonon relaxation and concentration quenching can be considered in the system under studies. Magnetic susceptibility measurements were carried out in 300–1.7 K temperature range and are discussed in relation to the structure. Effect of the polymeric structure on spectroscopic behaviour is presented. Selectivity of polymeric europium squarate in vitro test for different tumor cells is shown.

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