

Luminescent hybrid material based on a clay mineral

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Clay minerals, and within these, the smectite group, including the hectorites in focus, possess layered structures, in which interlayer chemistry may be applied to functionalize them optically. While luminescence from organic dyes has previously been described in the structurally closely related montmorillonites, attempts to obtain luminescence from occluded rare earths is not known to exhibit significant efficiency. This may in part be due to the presence of significant amounts of iron, but is mostly due to the inherent presence of water and structural OH groups. In the present paper, attempts to screen Tb³⁺ from disadvantageous matrix interactions by generating complexes with 2,2'-bipyridine within the interlayers are described, which eventually yield a 12-fold increase in emission intensity on complexation or about 20% in quantum efficiency, respectively. Even very low levels of iron impurities appear to still be a delimiting factor with regard to optical efficiency. However, if the