

Emission properties of silica-carbon dot composites with different porous structures

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Carbon dots (CD) are new class of emerging luminescent materials which are focused mainly in the direction of toxic ion detection and bioanalytes in liquid media. Solid-state applications are still limited due to poor optical and processing of CD in solid state. In this work, we study the luminescent properties of CD in different porous solids. Nitrogen functionalized carbon dots (CD_N) were prepared by thermal decomposition method and were embedded in silica matrix by sol-gel technique. The blue emitting CD_N in silica alkoxide precursors in the 2 step acid-base sol-gel route to prepare composite monoliths. The gels were then dried under different conditions to obtain variant porous structures in the form of xero-,cryo-and aerogels. The features of these porous solids were studied using transmission electron microscopy, thermal analysis, Mid-infrared spectroscopy, N₂ physisorption isotherms and time-resolved spectrofluorimetric technique. The emissive properties of the composites were studied, and results showed that the efficiency of emission was due to the loading of CD_N and textural features of the porous solid. Our investigation expands the exploitation of functional carbon dots through the production of fluorescent solid-state composites with tunable porosities. Some of our work has already been reported.

References:

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