Emission features of organic/inorganic amidosil nanohybrids

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The birth of “soft” inorganic chemistry processes, in particular the sol-gel route, allows the chemical design of pure and well-controlled multifunctional hybrid materials in which organic, inorganic, and even biological components are mixed at a nanosize level [1,2]. Increasing attention has been focused in the last decade on the photonic features of sol-gel derived organic/inorganic hybrid matrices, namely of the siloxane-based type. The hybrid concept has been also employed to synthesize stable and efficient white-light photoluminescent amine-functionalized hybrids lacking metal activator ions. The APTES hybrid with formic acid is one of the most efficient phosphors known amongst those not containing activator metal ions, with an external photoluminescence (PL) quantum yield of 35±1 %.

With the goal of further investigate the chemical-physical nature of such white-light nature and to develop innovative hybrid systems with a wide range of useful and tailored properties, new poly(ethylene)/siloxane composites were synthesized. In the host framework prepared, classed as amidosil, the organic and inorganic counter parts are covalently bonded through amido bridges. Two samples with different polymer molecular weights were prepared. The cross-links are in both sides of the polymer chain, d-A(8), and only in one of the terminal sides, m-A(14).

The emission and excitation emission spectra at RT and 12 K were measured. The emission spectra of both compound shows a broad band in the range between 350 and 680 nm. With increasing the excitation wavelength, the maximum intensity of the
spectra moves to lower energies. The time-resolved spectroscopy measurements expressed the presence of more than one PL component. The lifetime decays were monitored around the three components detected in the time resolved spectra. The data will be discussed and compared with that of similar organic-inorganic hybrids.

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