

Spectroscopic behavior of hybrid materials obtained by the sol-gel technique.

Autorzy

Jerzy Sokolnicki

Rafał Wiglusz

S. Radzki

A. Graczyk

Janina Legendziewicz

Rok wydania

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The need for new, chemically and physically stable luminescent materials operating with UV excitations has stimulated research on luminescence properties of doped sol-gel material. In this work we present technology of production of silica gels doped with organic molecules, lanthanide compounds and organic/inorganic composites. Optical properties of these materials as functions of temperature, concentration and excitation wavelength are presented. Dynamics of the excited states is discussed based on the decay times and emission efficiencies data. Mechanisms of ligand-to-metal energy transfer as well as other processes affecting emission efficiency are considered. Silica sol-gels doped with di-aminoacid derivatives of porphyrins: $PP(Ser)_2(Arg)_2$, $PP(Ala)_2(Arg)_2$, $PP(Met)_2(Arg)_2$, where Met, Arg and Ser denote methionine, serine and arginine aminoacids, respectively, and $H_2TTMePP$ {tetrakis[4-(trimethylammonio)phenyl]-21H,23H-porphine} have been obtained and spectroscopically studied. The samples emit only from the lowest excited singlet state (S_1). Intensity of this emission depends on the concentration of the active molecule and time of the exposition to the excitation beam. The sample containing $PP(Ser)_2(Arg)_2$ co-doped with Tb(III) ions exhibits only 5D_4 emission from the metal center. When co-doped with Pr(III) ions it displays only the S_1 emission and it has been shown that the metal ions affect the $S_2 \rightarrow S_1$ internal conversion. These materials can find applications as phosphors or sensors of UV irradiation. The efforts have been undertaken also to obtain chiral anisotropic materials.

Słowa kluczowe

Porphyrin derivatives, Lanthanide ions, Luminescence, Sol-gel

Adres publiczny

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