

Toward optical ceramics based on cubic Yb³⁺ rare earth ion-doped mixed molybdatotungstates: part I - structural characterization.

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Streszczenie

Yb³⁺-doped mixed molybdatotungstate powders of chemical solution La_{2-x}Yb_xMoWO₉, which crystallize in the cubic system with the space group *P*2₁3 (No. 198), were studied so that in further research they could serve to the fabrication of transparent optical ceramics. The powders were activated by Yb³⁺ ions with the concentration of (0.1, 1, 3, 10, 20 mol %) and were prepared by three various techniques: high-temperature solid-state reaction, Pechini, and combustion methods. The main goal of this Part 1 is primarily concerned with the structural characterizations of the cubic structure by XRD analysis, FT-IR, and Raman spectroscopies and of the morphology by SEM and TEM techniques, as well as the calculation of the optical band gap by diffuse reflectance spectroscopy. We have also checked the thermal stability of the samples prepared by combustion and solid-state methods. The TEM images indicated that via combustion method at 600 °C we succeeded to obtain the smallest nanocrystallites with average diameters between 60 and 80 nm. Obviously, the grain sizes increased with the rise of the annealing temperature applied during various types of synthesis. The morphology also differed according to combustion, Pechini, and solid-state methods used for fabrication. The first synthesis of translucent microceramics are also shown.

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