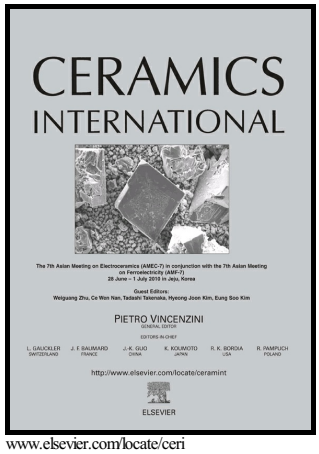

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Microwave-assisted hydrothermal synthesis and catalytic activity study of crednerite-type $CuMnO_2$ materials

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Abstract

A new and "flexible" microwave-assisted hydrothermal (MWH) synthesis of crednerite $CuMnO_2$ materials is proposed. Single-phase compounds are synthesized by means of the MWH method in a significantly shorter time than by conventional hydrothermal heating. $CuMnO_2$ single-phase compounds are obtained in the 80-180 ^oC temperature range, with times ranging from 5 min to 1 h, starting from nitrate reactants. The structure and the phase composition were studied by X-Ray diffraction and FT-IR spectroscopy, and reveal that all samples crystallize within the crednerite structure with the C2/m space group and without other impurities. The surface area is 59.5 m^2/g for the sample obtained at 120 ^oC, 5 min, and 76.8 m^2/g for the sample obtained at 80 ^oC, 5 min, respectively. The morphological analysis by transmission electron microscopy revealed plate-like nanoparticles, 20-50 nm in diameter. As application, in the case of the as-obtained products ~~exhibited enhanced~~ the catalytic activity was tested for hydrogen evolution in aqueous sulphide solution.

Keywords

Nanoparticles, fast synthesis, crednerite, catalysis

Introduction

Recent research efforts have focused on decreasing the size of delafossite crystals, so that these materials can be used for industrial applications, as they have been reported as promising candidates for p-type transparent conducting oxides [1] or photocathode materials in p-type dye-sensitized solar cells (DSSCs) [2]. Therefore, to optimize the properties of these