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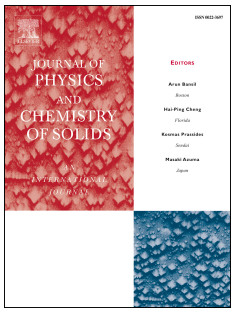

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Positron annihilation lifetime spectroscopy (PALS) study of the as prepared and calcined MFI zeolites

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Abstract

The synthesis of high silica zeolites in many cases implies the usage of organic structural direction agents (SDA). However, to manifest their functionalities, the SDA occluded inside the channels of the as-synthesized structure should be removed, usually by a high temperature treatment (calcination). In this paper, the positron annihilation lifetime spectroscopy (PALS) was used to monitor the development of accessible spaces, their sizes and distributions in MFI zeolites, ZSM-5 and silicalite-1 in order to give an additional insight in the process of the SDA removal. For that purpose, a conventional PALS setup with ^{22}Na positron source was applied. It was established that there is a pronounced difference between positron annihilation data for these two zeolites of the same structural type. The samples were additionally analysed by X-ray powder diffraction at room temperature with a crystal structure refinement and thermogravimetry.

Keywords: positron annihilation, high-silica zeolites, calcination