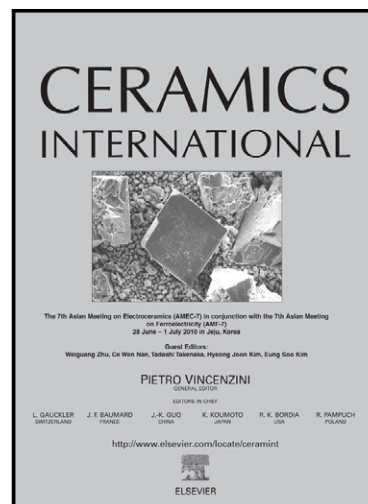


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Zeolite decorated highly porous acicular calcium silicate ceramics

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Abstract

Macrocellular calcium silicate (wollastonite) ceramic foams possessing ~86 vol% total porosity were produced from commercial calcium silicate hydrate (xonotlite) nano-size acicular crystals and poly-methyl-methacrylate microbeads (PMMA) (used as sacrificial pore formers). Open cell wollastonite foams had a bi-modal pore size distribution with major modes located ~100 nm due to interparticle porosity and ~100 μm due to the sacrificial pore former. These macrocellular ceramics were then used as a scaffold for MFI type zeolite (silicalite-1) synthesis. Monolayer coffin shaped zeolite crystals (~3 μm size, measured from c-axis and ~300 nm thickness) were observed with almost full coverage on the inner macro-cell walls. The specific surface area of the components increased from 9.6 m^2/g to 108.2 m^2/g via zeolite functionalization, leading to components possessing multiscale porosity.

Keywords

zeolite, wollastonite, xonotlite, foams, hierarchical porosity

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