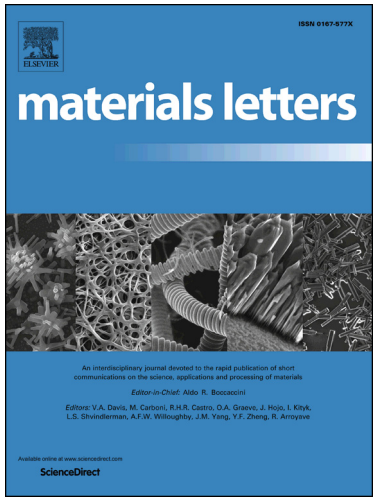

One-step fabrication of novel porous and permeable self-supporting zeolite block from fly ash

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One-step fabrication of novel porous and permeable self-supporting zeolite block from fly ash

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Abstract: Zeolite blocks, monoliths or membranes are normally synthesized in the presence of massive solvents via hydrothermal routes. Here we demonstrate an environmental friendly process of fabricating porous and permeable zeolite block from industrial by-product fly ash by adding oleic acid and aluminum powder in geopolymer block manufacture process. The resultant product is a foamed faujasite block with highly interconnected pores, which does not need further hydrothermal processing. SEM images and XRD patterns confirms the high crystallinity of the faujasite block. The compressive strength of the faujasite blocks is 3.07 MPa at the dry bulk density of 0.88 g/cm^3, and its total porosity is up to 57.69 vol%. The permeability of the fajasite block to water coefficient is 0.15 cm/s with BET surface area of 44.73 m^2/g, which is similar to those zeolites synthesized using traditional hydrothermal method.

Keywords: Zeolite block; Faujasite; Porous materials; Permeable; Fly ash; Geopolymer