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BOOK OF ABSTRACTS

AIMagn Associazione Italiana di Magnetismo

CNR ISMN ISTITUTO PER LO STUDIO DEI MATERIALI NANOSTRUTTURATI

Dipartimento di Fisica e Astronomia
Università di Bologna

Dipartimento di Fisica e Astronomia
Università di Bologna

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One-step synthesis of magnetic zeolites from waste materials

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Magnetic zeolites can be successfully used for removing contaminants from polluted water, as they can be easily separated by the solution using an external magnetic field. In such a way, the wastewater treatment becomes simpler than conventional processes, which imply time and energy consuming centrifugation or filtration steps [1,2].
In this study, a low temperature environmentally friendly synthesis of magnetic zeolites by hydrothermal activation is presented [3]. The major novelty of the process is the use of a mixture of waste materials namely, fly ash (FA) and red mud (RM), as precursors to synthesize zeolites with good magnetic properties in a *one step process*, i.e. without passing through the additional synthesis of magnetic nanoparticles, which is commonly used for the preparation of the magnetic zeolites. The structural properties were investigated by SEM, XRD and TEM and showed that different types of zeolites (A, X and ZK-5) were obtained for different FA/RM percentages and incubation temperature. All of them possess sufficiently high magnetic moment to allow their easy separation by the solution using an external magnet (Fig. 1). The magnetic investigation was carried out by SQUID and VSM magnetometry. The global magnetic properties of the newly formed minerals were discussed on the basis of magnetic properties of precursors, where different magnetic behavior was observed (Fig.1). Good adsorbance properties of the final synthetic products were confirmed.

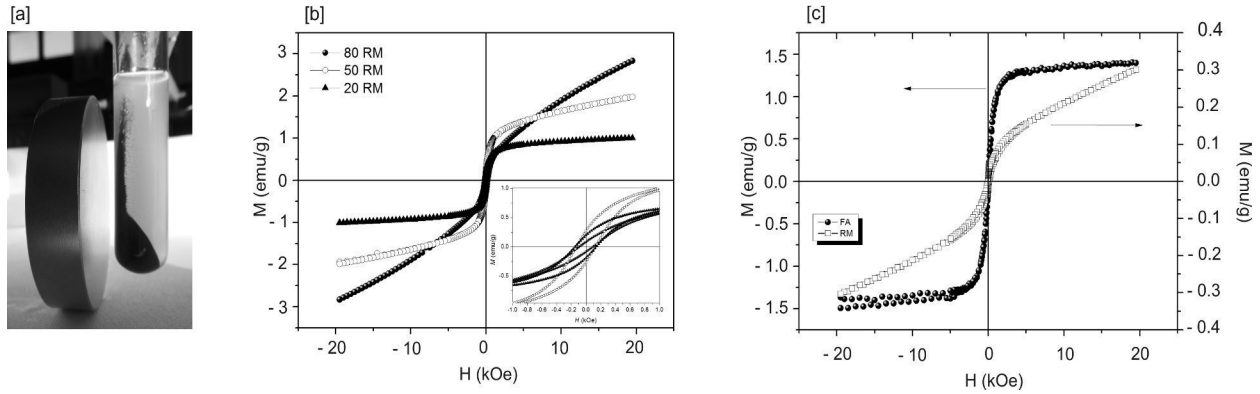

Figure 1. [a] magnetic separation for sample 20%RM; [b] Room temperature hysteresis cycles of the mixtures containing 20, 50 and 80 %RM, respectively;[c] Room temperature hysteresis for RM and FA samples (modified from Belviso et al. [3])

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[3] C. Belviso, E. Agostinelli, S. Belviso, F. Cavalcante, S. Pascucci, D. Peddis, G. Varvaro, S. Fiore, Micropor. Mesopor. Mat. 202 (2015) 208-216.