Poster Presentation

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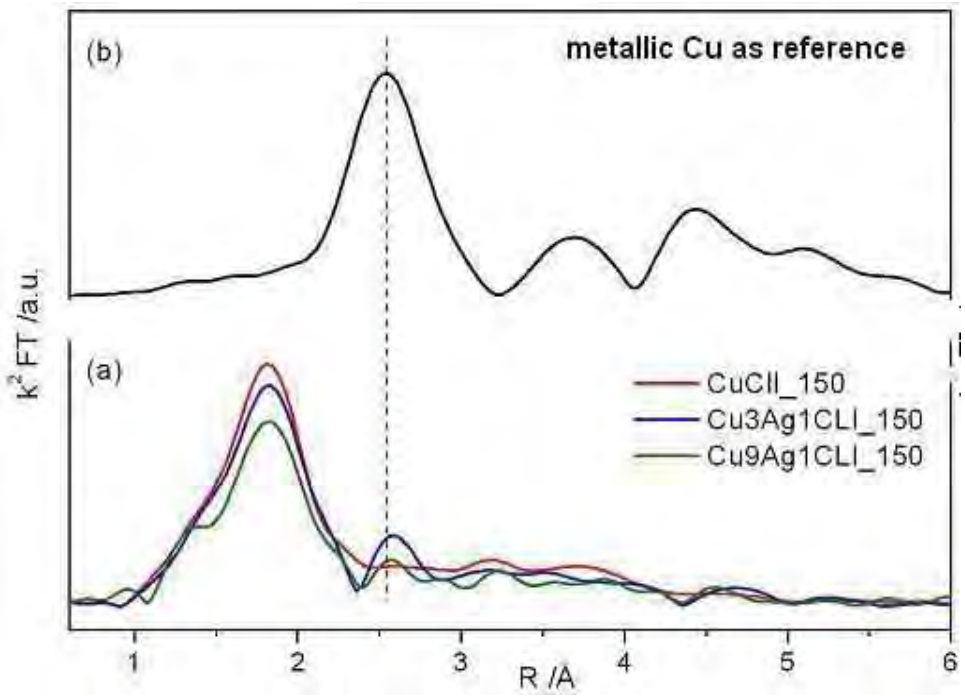
Reduction of Cu2+ in exchanged Ag+ natural clinoptilolite: structural study

B. Concepcion-Rosabal[1], A. Penton-Madrigal[2], I. Rodriguez-Iznaga[1], E. Estevez-Rams[2], V. Petranovskii[3]

[1]Universidad de La Habana, Instituto de Ciencia y Tecnologia de Materiales (IMRE), La Habana, Cuba, [2]Universidad de La Habana, Facultad de Física – IMRE, La Habana, Cuba, [3]Universidad Nacional Autonoma de México, Centro de Nanociencias y Nanotecnologia (CNyN), Ensenada, B.C., México

Modified zeolites with cations, clusters and metallic nanoparticles are of interest due to the possibility to develop materials with new properties [1]. A study concerning the thermal reduction under hydrogen flow of mixed bimetallic system Cu2+ and Ag+ exchanged natural clinoptilolite Tasajeras deposit, Cuba is presented. The influence of silver in the reduction of Cu2+ was studied. X-Ray diffraction experiments on natural clinoptilolite, as well as on ion-exchanged monometallic and bimetallic samples were performed. The peak intensities of the exchanged samples, are changed as a result of the ion exchange, and they are fundamentally associated with differences in nature, amount and position of the extra-framework ions in the channels of the natural zeolites [2, 3]. The fig 1 shows the magnitude of the Fourier Transform (FT) for the EXAFS signals of the natural clinoptilolite exchanged with Cu2+ and of the natural clinoptilolite exchanged with both Cu2+ and Ag+ and reduced at 150 oC . The TF of the experimental EXAFS signal of metallic Cu, has been also added. The amplitude of the peak at 1.82 Å, associated with the coordination of Cu2+ with 4 oxygen atoms, decreases upon Cu was added. A detailed analysis of the graph reveals also that for the exchanged and reduced samples a peak at 2.58 Å begins to emerge. This maximum coincides with the first maximum of the metallic Cu and may be associated with the formation of small clusters of Cu. The addition of Ag+ favors the decrease of the reduction temperature of Cu2+. The reduction of Cu2+ and Ag+ cations shows existence of notable interinfluence between both cations during this process. The Cu2+ reduction is favored by the presence of Ag+. The aggregation of the reduced highly dispersed species both for copper and silver is limited in this bimetallic system. The introduction of Ag+ as the second cation in the copper exchanged zeolites appears to be an efficient tool for the control of the size of the resultant reduced nanoparticles.

[1] *I. Rodríguez-Iznaga, V. Petranovskii, G. Rodríguez-Fuentes, et al., J. Colloid Interface Sci 316 (2007),* ***[2]*** *I. Rodríguez-Iznaga, V. Petranovskii, F. Castillón-Barraza, et al., Journal of Nanoscience and Nanotechnology Vol. 11, (2011),* ***[3]*** *O. E. Petrov, Natural Zeolites '93: Occurrence, Properties, Use edited by D. W. Ming and F. A. Mumpton, Brockport, New York (1995)*



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