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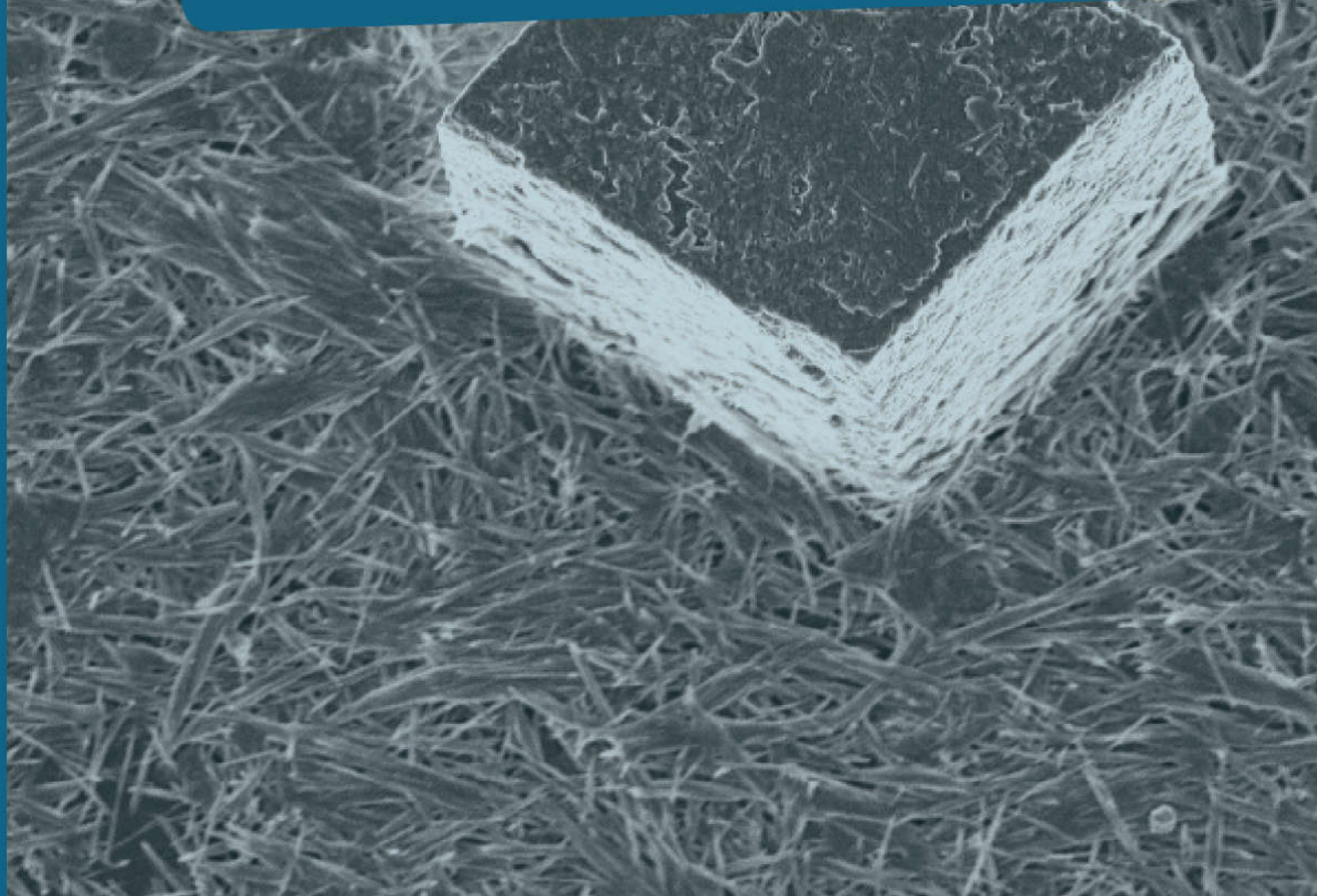
CLAYS, FROM THE OCEANS TO SPACE

ICC 2017
GRANADA, SPAIN

XVI International Clay Conference



XVI
International Clay Conference
ICC 2017

Granada, Spain
July, 17-21, 2017

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XVI ICC - 16TH INTERNATIONAL CLAY CONFERENCE

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Sociedad Española de Arcillas (SEA)

UNDER THE AUSPICES OF:

- Association Internationale pour l´Étude des Argiles (AIPEA)
- Consejo Superior de Investigaciones Científicas (CSIC)
- Universidad de Granada (UGR)
- Ministerio de Economia, Industria y Competitividad
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Co-IMPREGNATED Al-PILLARED CLAY AS CATALYST IN FENTON-LIKE DEGRADATION OF AZO-DYES IN THE PRESENCE OF OXONE

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In past decades natural waterbodies have been severely struck by uncontrolled wastewater release. The most harmful water pollutants include different organic compounds, such as synthetic dyes. Catalytic wet peroxide oxidation has been widely investigated as a method for catalytic degradation of organic water pollutants. This is a heterogeneous catalytic process based on the homogeneous Fenton reaction [1,2] that yields hydroxyl radicals capable of disrupting chemical bonds in organic molecules. Sulphate radicals, generated by the conjunction of cobalt with peroxymonosulfate (Oxone), are even more efficient oxidants than hydroxyl radicals. It is due to their higher standard reduction potential comparing with that of hydroxyl radicals [3].

In this work, cobalt impregnated aluminium pillared clay was synthesized, characterized and tested as catalyst in the catalytic wet peroxide oxidation of tartrazine dye in the presence of Oxone reagent. The synthesis consisted of the pillaring of Wyoming bentonite clay (Source Clay Repository of the Clay Minerals Society) with particle sizes of up to 2 μm, followed by the deposition of cobalt oxide species using the incipient wetness impregnation method. Phase compositions, textural and chemical properties of the obtained material were investigated using X-Ray Powder Diffraction, Low Temperature Nitrogen Physisorption, Scanning Electron Microscopy along with Electron Dispersive X-Ray Spectroscopy, as well as Diffuse Reflectance UV-Vis spectroscopy. The optimization of the catalytic degradation of tartrazine dye using the obtained cobalt containing pillared clay was performed regarding heterogeneous catalyst and Oxone concentrations, mixing regime etc. The reaction was monitored with respect to time using UV-Vis spectroscopy. The obtained spectra implied complex mechanism of the reaction that included the degradation of the dye, and the occurrence and subsequent removal of intermediates. Tartrazine degradation using cobalt impregnated aluminium pillared clay and Oxone reagent appears to be efficient since the reaction conditions under which almost complete removal of species detectable by UV-Vis spectroscopy were established.

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