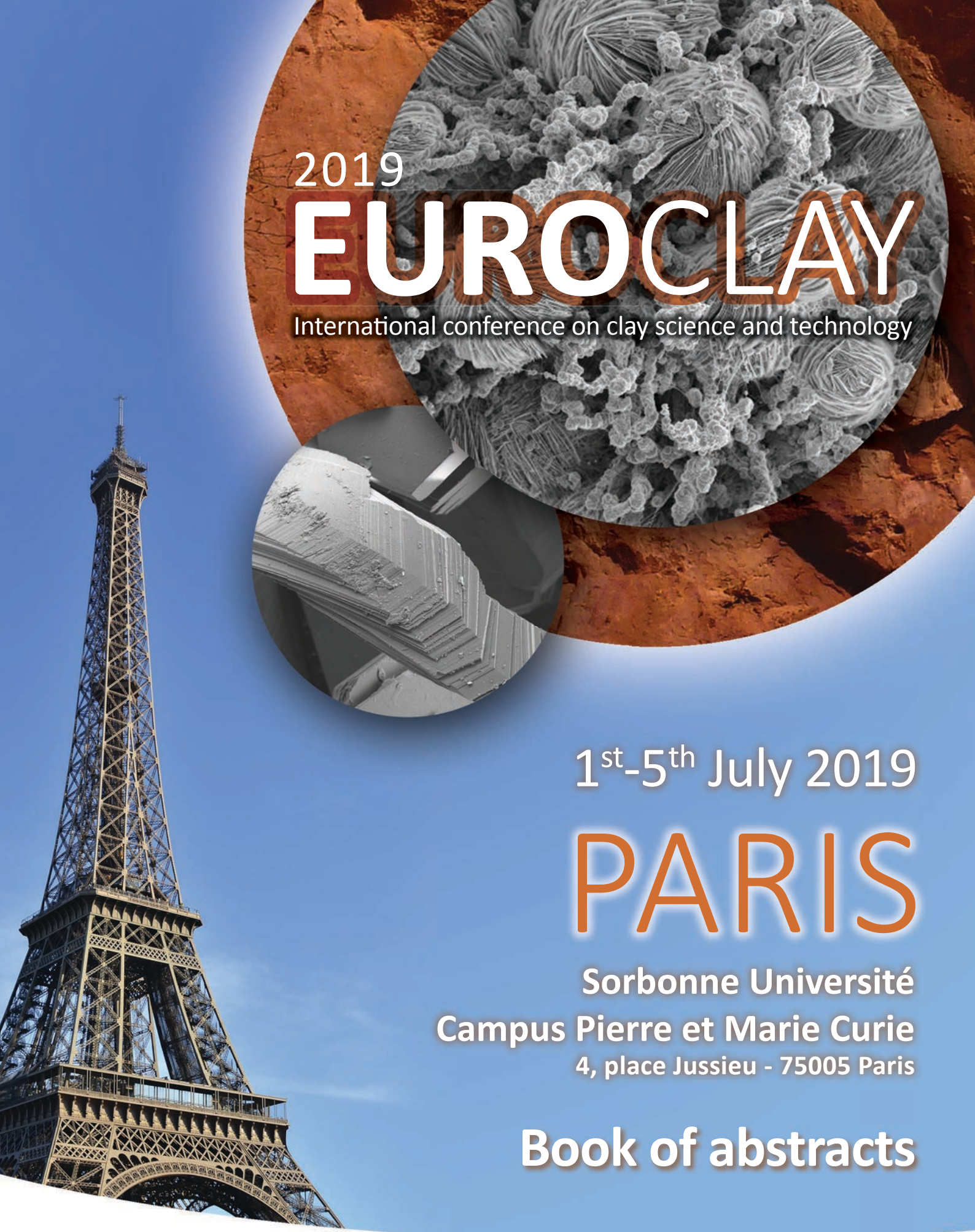
2019

EUROCLAY

International conference on clay science and technology



1st-5th July 2019

PARIS

Sorbonne Université
Campus Pierre et Marie Curie
4, place Jussieu - 75005 Paris

Book of abstracts

ECGA

The Clay Minerals Society

MCM

GFA Groupe Francais des Argiles

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Cobalt impregnated smectites (raw and acid activated) as catalysts in organic dye oxidation process in the presence of peroxymonosulfate generated radicals

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Smectite based Co catalysts were prepared using the wetness impregnation method and applied as activators of potassium peroxymonosulfate as the source of sulfate radicals and tested in the degradation of Acid Orange 10 (AO10) in aqueous solution. Starting smectite clay (Bogovina, Serbia) was submitted to acid activation which resulted in enhanced textural properties [1].

The starting smectite (S) and acid activated (S_A) were impregnated with predefined amounts of $Co(NO_3)_2$ which corresponded to 1.0 or 0.5 times the value of CEC. The impregnation process was followed by calcination at 450 °C during 6 h. The obtained catalysts were denoted according to the type of activation and Co^{2+} loading as: 1.0Co/S, 0.5Co/S, 1.0Co/S_A and 0.5Co/S_A. The chemical and phase composition of the catalysts were determined using XRF and XRD method, respectively. Textural properties were monitored using the low temperature N_2 physisorption method. Potassium peroxymonosulfate (Oxone® i.e. $2KHSO_5 \cdot KHSO_4 \cdot K_2SO_4$) was used as the source of sulfate radicals generated by cobalt incorporated into smectite structure of Co/S and Co/S_A. The influence of cobalt content and acid modification on the efficiency of the decolorization of dye solutions was investigated. The decolorization of AO10 was monitored using UV–Vis spectrophotometry at λ_{max}=478 nm.

All catalyst efficiently decolorized investigated dye within 4 h. The decrease of absorbance at the characteristic wavelength was tested with different kinetic models and the exponential equation showed the best fit indicating the first order kinetics for investigated catalytic systems. The increase of cobalt content had higher impact on decolorization rate than the development of porous structure achieved by acid activation.

Acknowledgment: This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Project No. III 45001).

[1] Vuković Z.; Milutinović-Nikolić A.; Krstić J.; Abu-Rabi A.; Novaković T.; Jovanović D. (2005) Mater. Sci. Forum, 494, 339-344.