ANAIS

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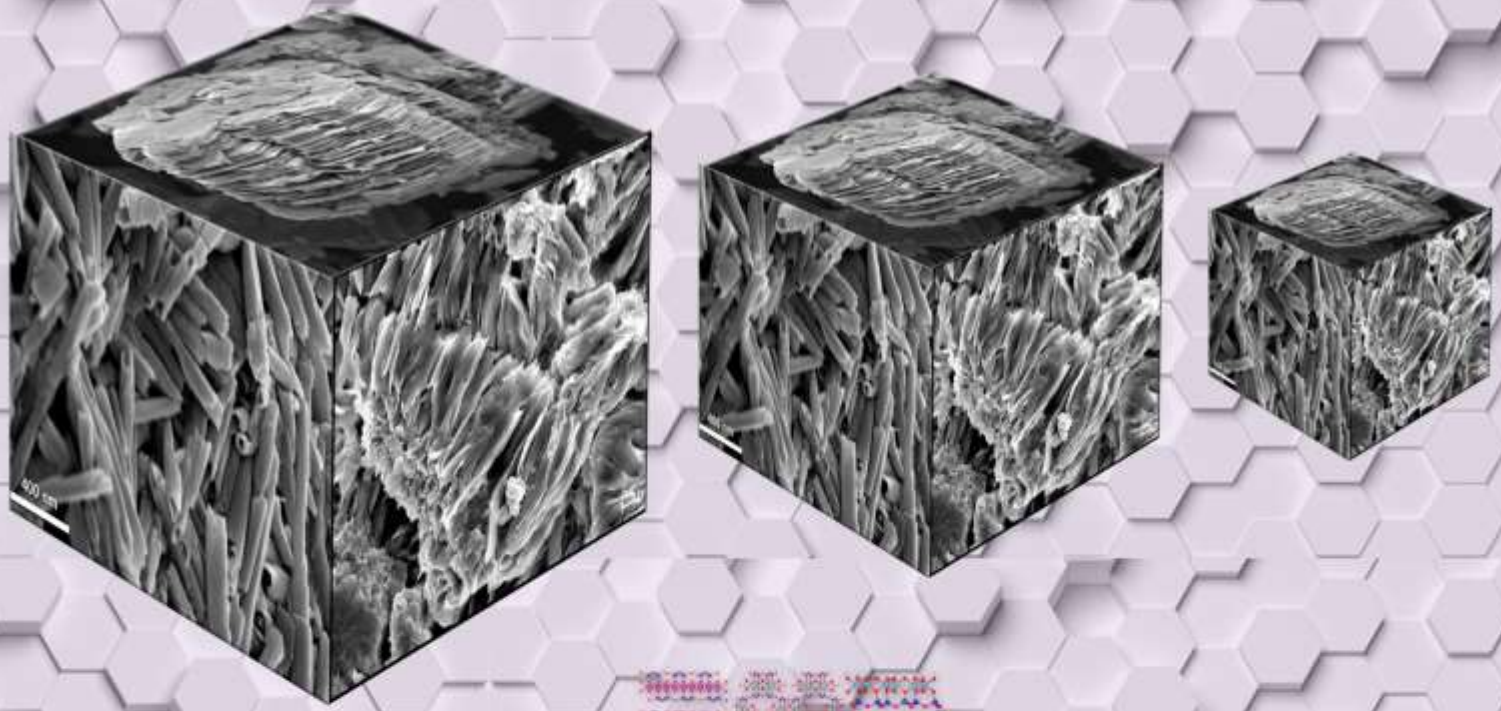
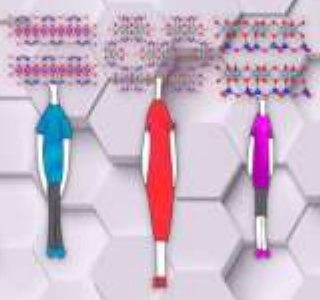
V REUNIÃO ANUAL SOBRE ARGILAS APLICADAS

28 - 30 AGOSTO DE 2019

ARGILOMINERAIS E NANOCOMPÓSITOS: O PRESENTE, O PASSADO E FUTURAS APLICAÇÕES





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STUDY OF THE ADSORPTION CAPACITY OF PROPRANOLOL AND IBUPROFEN IN ORGANICALLY-FUNCTIONALIZED HIGH-LOAD EXPANDABLE MICAS AT DIFFERENT PERCENTAGES OF THEIR CATION EXCHANGE CAPACITY

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In this work was studied the use of two high-charge swelling micas, Na-Mica-4 and organo-highly charged micas with different percentages of cation exchange capacity (C18-mica-$4_{(25\%)}$; C18-mica-$4_{(75\%)}$; C18-mica-$4_{(150\%)}$ y C18-mica-$4_{(250\%)}$ for the removal of propranolol, ibuprofen and mixtures of both from aqueous samples. To this end, Na-Mica-4 was synthesized by the NaCl melt method [1]. The interlayer space of the highly charged synthetic mica Na-mica-4 can be modified by ion-exchange reactions involving the exchange of inorganic Na^+ cations by surfactant molecules (octadecylamine) which results in the formation of an organomica (C18-mica-4) [2,3]. The physicochemical characterization of the synthetic materials was evaluated in detail by conventional techniques: plasma emission spectroscopy (ICP), X-ray diffraction (XRD) and Zeta potential (ζ) before and after the adsorption experiments. The range of interlaminar expansion d (001) was measured by XRD: (Na-mica-4 (12.05-12.21 Å); C18-mica-$4_{(25\%)}$ (47.25 – 47.96 Å); C18-mica-$4_{(75\%)}$ (47.62-48.80 Å); C18-mica-$4_{(150\%)}$ (48.05 – 49.33 Å); C18-mica-$4_{(250\%)}$ (49.54 – 49.25 Å). Surface loading of all materials was measured by zeta potential in a range (-20.11 – 55.43 mV). The adsorption studies of the emerging contaminants were carried out by HPLC in water samples enriched with 10 $mg \cdot L^{-1}$ of propranolol, ibuprofen or with a mixture of both drugs (prop. + ibu.). The pollutant removal rates were: Ibuprofen – C18-mica-$4_{(250\%)}$ (93%); Propranolol – Na-mica-4 (70%) and ibuprofen in mix–C18-mica-$4_{(250\%)}$ (96%) at pH 6, after 24 h. The present study, showed an excellent availability of synthetic highly charged mica (Na-Mica-4) to be organofunctionalized, high correlation between the log Kow (distribution coefficient) of the emerging pollutant and the adsorption affinity of the materials towards the drug. Finally, organomica C18-mica-$4_{(250\%)}$ was considered the most efficient in the removal of ibuprofen from both the solution containing only ibuprofen and the solution containing a mixture of both drugs. Propranolol was essentially eliminated with Na-mica-4 from the pure propranolol solution.

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References

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