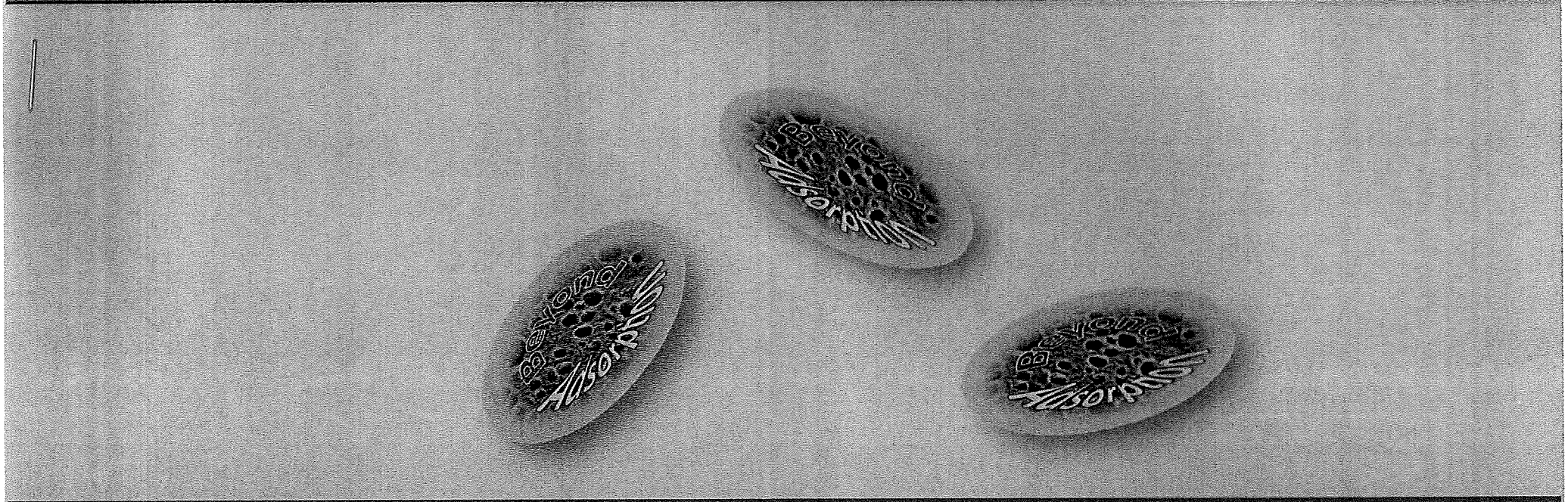
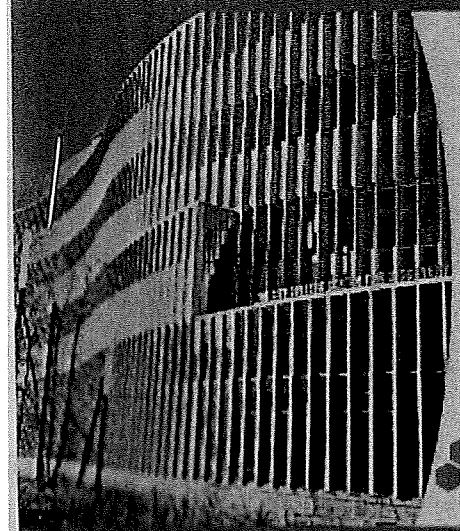
Beyond adsorption II: new perspectives and challenges for nanoporous carbons



SATELLITE SYMPOSIUM TO CARBON 2019



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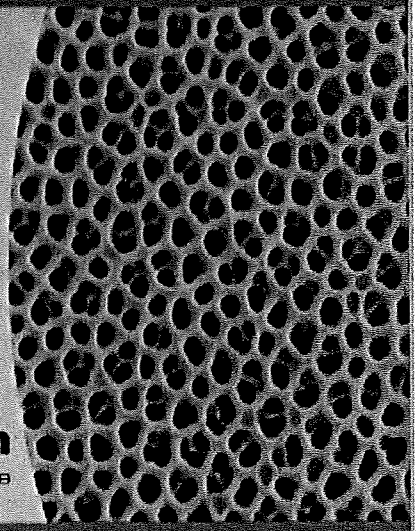

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ORAL 3

ANOMALIES IN ADSORPTION AND PHOTOCATALYTIC DEGRADATION OF RHODAMINE-B ON TANNIN-DERIVED ORDERED MESOPOROUS CARBONS

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Short Abstract

Ordered mesoporous carbons (OMCs) were prepared by a soft-templating method using tannin (T) as carbon precursor and the triblock copolymer Pluronic F127 (P) as micelle generator. Water was used as solvent and to promote the interaction between the phenolic groups of T and the hydrophilic sections of P in order to favor the T-P mesophase formation. After carbonization of the T-P mesophase, an OMC was obtained that was further activated with CO_2 in order to develop its textural properties. The resultant activated OMCs (AOMCs) had BET areas ranging from 780 to 1090 m^2/g after 0.5 and 2h of activation, respectively. Interesting anomalies were observed during the kinetics of rhodamine B (RhB) adsorption: after a first and very fast uptake, the adsorbed amount decreases before it starts increasing again until a plateau is reached. This behavior was reproducible and highly dependent on the initial concentration of the pollutant.

The photocatalytic performances of the AOMC having the highest surface area were evaluated in the removal of a model pollutant, RhB, in aqueous phase. The photocatalytic activity of this AOMC was up to 3.4 (second-order kinetics) times higher than that of commercial TiO_2 mainly due to the higher surface density of RhB molecules adsorbed on the AOMC compared to TiO_2. Finally, different kinetics and isotherm models were applied to the RhB adsorption data and correlated with the photocatalytic activity. The obtained RhB removal performances were compared with those published in the open literature.

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