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BOOK OF ABSTRACTS

UNIVERSITY of DEBRECEN

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June 11-14, Hajdúszoboszló/Debrecen, Hungary

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Acid-base properties and sequestering abilities towards toxic metal ions of cyclodextrin-calixarene co-polymers

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Smart materials with stimuli-responsive properties represent an interesting research area considering both their potential applications and the conceptual issues implied. They might be successfully employed in various fields, such as drug carrier/delivery devices to sensors, environment remediation, active packaging [1-2]. In this contest, we have recently synthesized various pH-responsive pre- and post-modified cyclodextrin-calixarene nanosponges (**CyCaNS**s) with 1,2,3-triazole linker units (**ACNS**s) able to vary their sequestering abilities towards organic and inorganic compounds. In particular, their adsorption properties were varied changing the molar ratio between the co-monomers, and the substituent groups present on each co-monomer scaffold and introducing ionizable groups by chemical post-modification.
A representation of the synthesized nanosponges is reported in the following Figure.

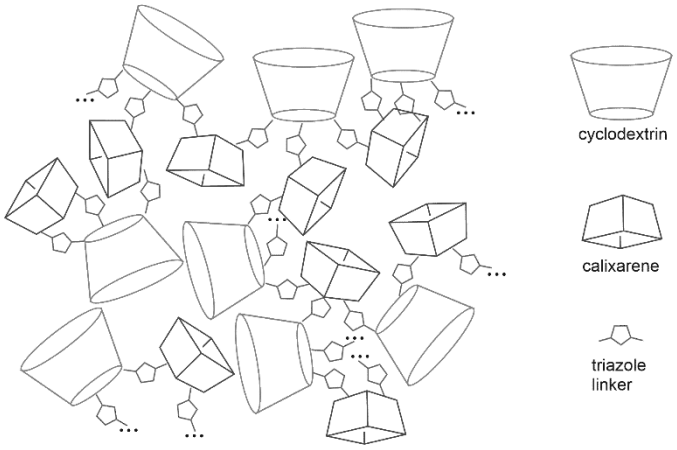

Figure 1. Cyclodextrin-calixarene nanosponges [3]

The experimental results showed that a fair pH-tunability was possessed even by non-modified materials, and this behavior was tentatively attributed to the presence of the triazole linkers, which may act as weak bases. This hypothesis, however, implies that triazole linkers should largely increase their basic strength (up to several orders of magnitude), due to their insertion in the polymeric network.
With the aim of clarifying the latter point, in the present work we perform a systematic study on the acid-base properties and on the sequestration abilities of nanosponges towards a series

of toxic metal ions. In particular, a panel of fifteen materials previously characterized (FT-IR, $^{13}C\{^{1}H\}$ CP-MAS solid state NMR, thermogravimetry) [3-4] was taken into account. Their acid-base behavior was investigated by means of ISE-H^+ potentiometric titrations, whereas their adsorption abilities were tested on a set of metal ions measuring their concentrations in the solutions by differential pulse anodic stripping voltammetry. ISE-H^+ potentiometric data were analyzed assuming the existence of different units, one for each type of functional group in the polymer. Protonation constants of functional groups of each unit were calculated by using different models already tested on others polymeric substances [5].

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