Praise Worthy Prize

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Special Section on Open Door Initiative (ODI) - 2nd edition

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PREFACE
to the collection of articles of the 2nd edition of the *Open Door Initiative* of IRECHE devoted to *Magnetic adsorbents for separation and decontamination*

Dear Readers,

This collection of 6 articles is a result of the work of many authors who trusted us to contribute to the 2nd ODI collection devoted to "*Magnetic adsorbents for separation and decontamination* ".

Magnetic adsorbents and in general, removal of species fro aqueous solution by magnetic techniques is highly explored are with an enormous plethora of articles appearing in the literature. Some applications have been reviewed [1], [2], [3], [4] and will be reviewed due to the everyday development of new magnetic compounds for specific purposes.

The collection contains five articles addressing various applications of magnetic adsorbents and one on application of natural magnetite for silver deposition (cementation) fro. The collection begins with the review of Safarik et al. [5] on magnetically responsive activated carbons applied *biosciences, biotechnology, medicine, analytical chemistry and environmental technology*. These adsorbents can be easily separated from complex systems or targeted to a desired place using an external magnetic field. The authors encompass the typical procedures necessary to convert the non-magnetic activated carbons into magnetically responsive bodies. We suggest this text will be useful for the readers and it dissemination will be a good success of the second edition of the ODI collection.

In the context of magnetically responsive composites, the work of Fungaro et al. [6] present results on a successful combination of the adsorption characteristic of zeolite magnetic oxide resulting in an adsorbent for removal of U(VI) from aqueous solutions by a batch technique. The effects of the operating conditions was successfully evaluated and analyzed using three kinetic equations including pseudo-first order equation, pseudo-second order equation and intraparticle diffusion model. Moreover, the Freundlich and the Langmuir isotherms were tested with the experimental data. The second-order kinetic model and the Langmuir model performed themselves as the most suitable model and correlate experimental data.

Tetraethylenepentamine (TEPA) functionalized, core-shell structured, nano magnetic polymer adsorbents (TEPA-NMPs) for the removal of Cr (VI) from aqueous solution in the presence of Cu (II), or Ni (II), or Zn (II) ions were developed by Shen et al. [7]**.** Batch adsorption studies were carried out to evaluate the effect of the co-existing ions on its adsorption properties to Cr (VI). Presumed mechanism of the competition of Cu (II), or Ni (II), or Zn (II) with Cr (VI) was proposed. The adsorption mechanism of adsorbents to Cr (VI) coexisted with Cu (II) was deeply studied via FTIR.

The magnetic chitosan-magnetite composite are reported by Hritcu at al. [8] Microparticles (Fe-Cc) were tested as new adsorbent for cobalt and nickel ion separations from aqueous solutions. The main effect of the pH, initial target ion concentration and adsorbent amount were tested in order to define the optimal conditions for batch adsorption. The new adsorbent exhibits a maximum adsorption capacity of 588.24 mg/g for cobalt ions and respectively 833.34 mg/g for nickel ions. The tests reveal that up to three times desorption regenerations are possible without significant loss in adsorption capacity. The data were fitted using Langmuir, Freundlich, as well as respectively the Dubinin-Radushkevich isotherm models. The Langmuir model was found to be the most suitable one.

The work of Cheng et al. [9] on the use of magnetotactic bacteria as bio-sorbents for heavy metal elimination from industrial effluents is the only one of the collection dealing with modelling of the effects of microscopic intermolecular forces on the adsorption of Cu^{2+}. In addition, acid-base titration experiments were carried out to determine the functional adsorption groups on magnetotactic bacteria surfaces. This allowed establishing the bacterium cell model consisting of -PO_3H, -OH, -COOH and a magnetosome. The contributions of the functional groups to the adsorption of Cu^{2+} were simulated and analyzed from the aspects of electrostatic interaction and thermal motion.

The last article [10] of the collection deals with a new application of the natural magnetite commonly used as adsorbent [11]. The cementation of precious metals from aqueous solutions is largely applied in the industry using iron scrap, copper and zinc dust. This work demonstrates the possibility to perform a silver recovery by cementation, even though the initial idea was that the mechanism was based on adsorption taking into account the complex surface of the magnetite. The tests performed reveal the optimal value of the pH, the effect of the amount of magnetite loaded to the solution and the type and shapes of the deposits. The optimal conditions were established near to the point of zero charge of the magnetite, resulting in maximum silver recovery. The treatment with sulphuric acid indicates formation of dendrites with decrease in the pH. The same effect was observed with *ad hoc* experiments with replacement of the sulphuric acid by selenic and telluric acids.

Finally, we like to express the gratitude to all authors working on magnetic particles for recovery of species from aqueous solutions and contributing to this collection of articles. We hope these results will be widely used by the academic society as valuable contributions to this intensively developed research area.

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