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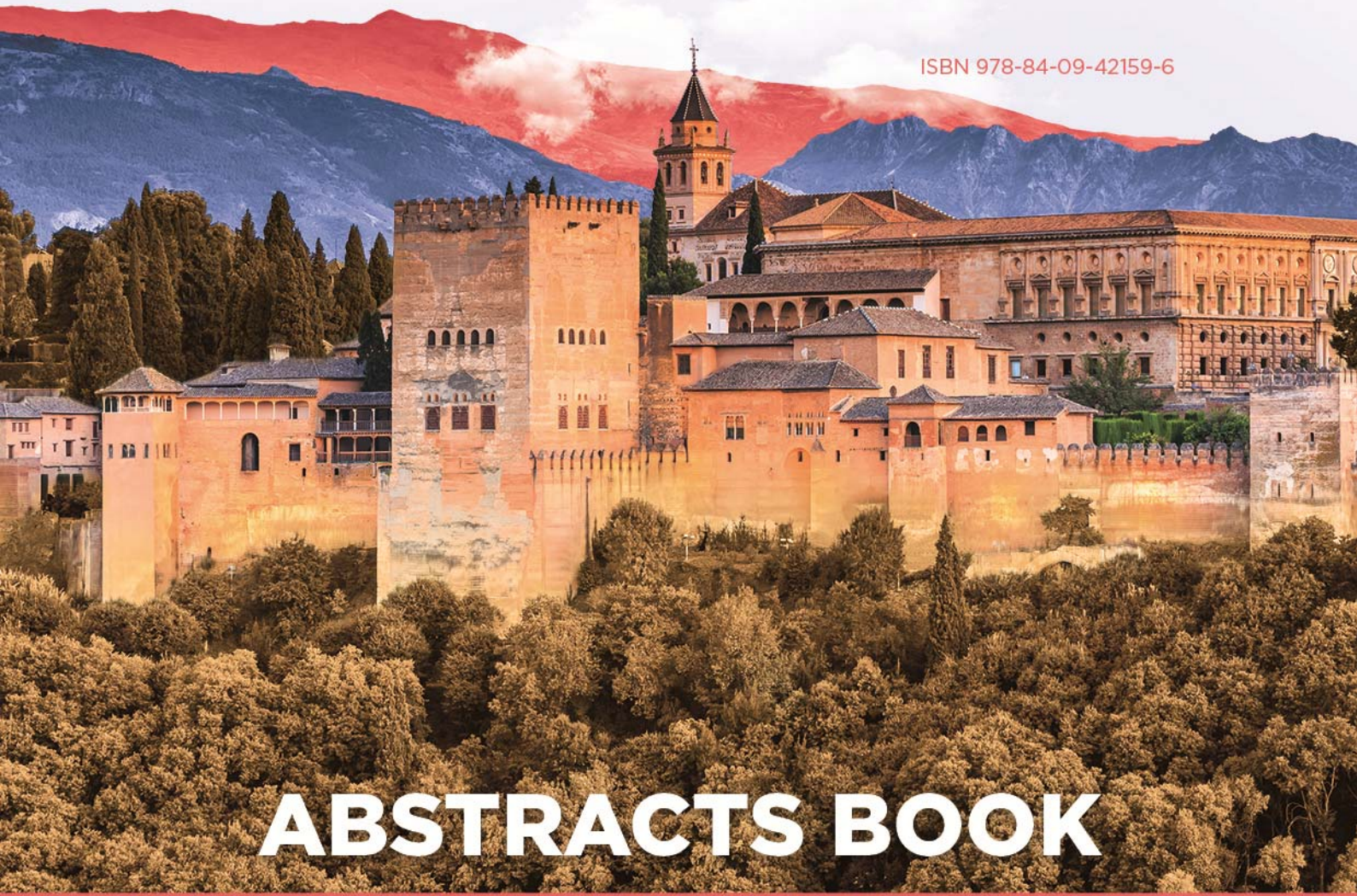

ABSTRACTS BOOK

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La(III), Cd(II) AND Ni(II) BIOSORPTION USING ALGAE RESIDUE

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Water contamination by heavy metals represents a major ecological and health problem given their toxicity and their tendency to accumulate in the food chain [1]. Rare earth metals constitute strategic metals that require careful recycling. Most metal recovery processes from wastewater are expensive and inefficient, especially at low concentrations, and they can also generate new residues that, in turn, need to be treated.

Brown algae have the capacity to accumulate metal ions, thanks mainly to the alginate present in the cell wall containing functional groups (hydroxyl, carboxyl, amines, etc.) [2]. During the extraction of bio-stimulants from algal biomass a residue is produced; the algae residue is currently poorly valorized. In this study, the residue issued from the treatment of brown algae *Laminaria digitata* was used for the biosorption of La^{3+}, Cd^{2+} and Ni^{2+} from aqueous solution (single vs. binary metal solutions).

The algae residue (sorbent) is used directly, without physical, chemical or mechanical treatment. The pH analyses, both of the sorbent (pH_{PZC} determination) and the metal-bearing solutions, correlates the optimum pH (at pH close to 5) with the surface charge of the sorbent. The kinetic curves are systematically fitted by the pseudo second order rate equation, with kinetic coefficient (Figure 1). Single system sorption assays revealed similar sorbent adsorption capacity for La (0.83 $mmol \cdot L^{-1}$) and Cd (0.81 $mmol \cdot L^{-1}$), and slightly lower for Ni (0.71 $mmol \cdot L^{-1}$). However, in binary systems (i.e., La:Cd and La:Ni), the selectivity of the sorbent towards La is highly favorable, thus contributing to separate La from Cd and Ni (Figure 2). Analysis by XPS and FTIR revealed the presence of carboxyl and hydroxyl functional groups and their contribution into the mechanism of metal ion binding, through an ion exchange mechanism. SEM and SEM-EDX observations were also used for characterizing the materials and the distribution of metal ions at the surface of the sorbent.

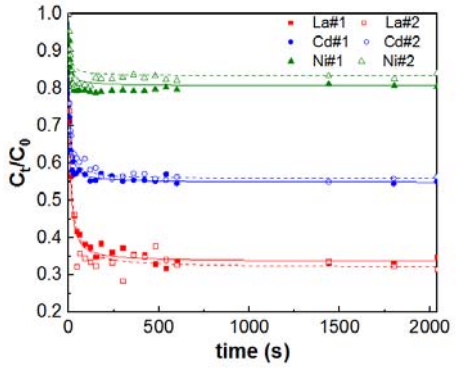

Figure 1. Kinetics profiles for La^{3+}, Cd^{2+} and Ni^{2+}. Sorbent dosage: 0.5 $g \cdot L^{-1}$

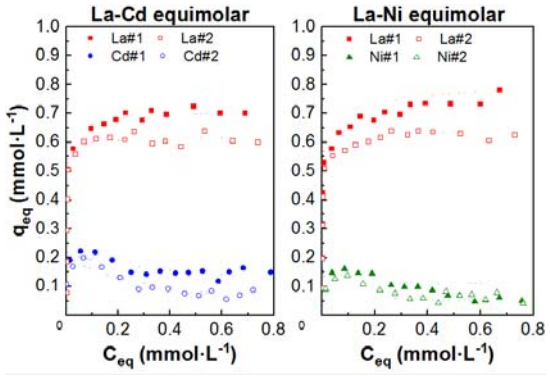

Figure 2. Sorption isotherms for equimolar binary system

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