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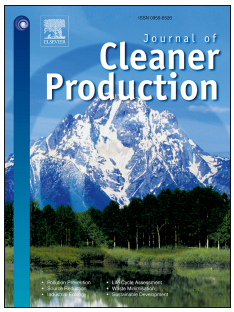

Carboxyl functionalized *Cinnamomum camphora* for removal of heavy metals from synthetic wastewater-contribution to sustainability in agroforestry

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Carboxyl functionalized *Cinnamomum camphora* for removal of heavy metals from synthetic wastewater-contribution to sustainability in agroforestry

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Abstract: Biosorption of heavy metals (HMs) using agricultural and forestry wastes (AFWs) attracts much attention due to numerous advantages, but more studies are necessary to develop effective biosorbent using locally available AFWs. *Cinnamomum camphora* leaves were used for HMs removal from synthetic wastewater. Carboxyl functionalized camphor leaf (CFCL) was prepared by a two-step modification including alkalization and carboxylation. Sorption of Cd(II), Cu(II) and Ni(II) was evaluated at different CFCL dose, pH, contact time and initial concentration of HMs. Experimental data were examined by sorption isotherms, kinetic models and thermodynamics equations. XPS, FTIR, XRD and SEM verify the introduction of carboxyl groups on CFCL and reveal sorption mechanism. CFCL is effective for fast removing metal ions with low concentration. The removal rate reaches 99%, and the maximum sorption capacity is 62.42 mg g^{-1} Cd(II), 49.96 mg g^{-1} Cu(II), and 26.42 mg g^{-1} Ni(II), respectively. Sorption of Cd(II), Cu(II) and Ni(II) onto CFCL is spontaneous and follows pseudo-second order and Langmuir model. CFCL also shows a good regeneration and cycling performance. This work suggests that the modified camphor leaf has remarkable potential as biosorbent for fast removal of HMs. Conversion of camphor leaf into value-added biosorbent reduces its negative effects and HMs pollution, providing a sustainable way to utilize agricultural and forestry wastes.

Keywords: Carboxyl; Cinnamomum camphora; Heavy metals; Sorption; Wastewater