NOVEL BIOMATERIAL: DESIGNING, CHARACTERIZATION AND MODIFICATIONS FOR DECONTAMINATION OF METALS FROM WASTE WATER- A GREEN APPROACH

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ABSTRACT

Water is particularly vulnerable to contamination from discharge of waste by various industries, among which heavy metals are the most important components. Existing methods of waste water treatments are associated with technical, economical and other practical constraints. This search has brought newly emerging terms like ***Clean processes, Environmentally Benign processes and Green processes*** to the foreground of scientific interest as a potential basis for the design of novel waste water treatment process. New technologies for the removal of toxic metals have directed attention to biosorption phenomenon which is based on the metal binding capacity of biomaterials. However, the use of biomaterials including agricultural wastes has several drawbacks also related to their less sorption efficiency, specificity and stability, restricting their commercial use. Constructive efforts towards their modifications leading to novel biomaterials for decontamination of toxic metals from water bodies as economically viable green processes are in great demands.

A laboratory based physico-chemical scheme has been developed, exploring the properties of *Ficus religiosa* for the removal of metals [Pb (II), Cd (II), Cr (III) and Ni (II)] from their single and multi metal solutions. Experiments result into the standardization of optimum conditions for sorption of toxic metals ranging from 60 to 90%. The work also addresses handling of percentage sorption efficiency of each metal in terms of thermodynamic feasibility of process and regeneration of metal loaded biomaterial. Special emphasis is paid on chemical modifications resulting into tailored novel biomaterials to improve sorption efficiency

[5 to 20 %] using synthetic modifications like Acetylation and Succination. Graft Co-polymerized biomaterial results into the increase in environmental stability [10°C-30°C] and number of regeneration cycles of modified biomaterials [3 to 5].

The findings open up new avenues in the removal of toxic metals as cost effective, environment friendly, safe, fast pre-treatment step for waste water as green technology.