Design of metal-oxide nanoparticle reinforced Nano-fibrous biopolymer composites for water treatment

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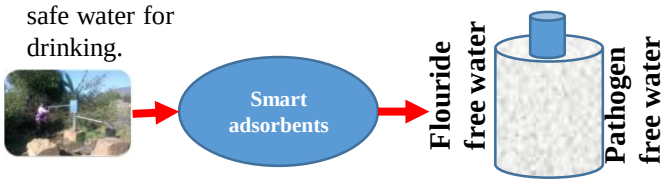
Introduction

A series of multifunctional biopolymer-metal oxide nanoparticle reinforced composites, will be fabricated and tested for simultaneous fluoride, metal species, nitrates, chlorides, turbidity and pathogen removal in ground and surface water. The biopolymer-metal oxide composites performance will be evaluated in a series of batch tests where conditions of operation will be optimized. Optimized biopolymer-metal oxide composite will then be tested using both batch and gravity flow tests. Their short term and long term performance will be ascertained interm's of water quality and durability for both chemical species and pathogenic contaminants. The successful composite will be piloted in a rural community set-up in South Africa

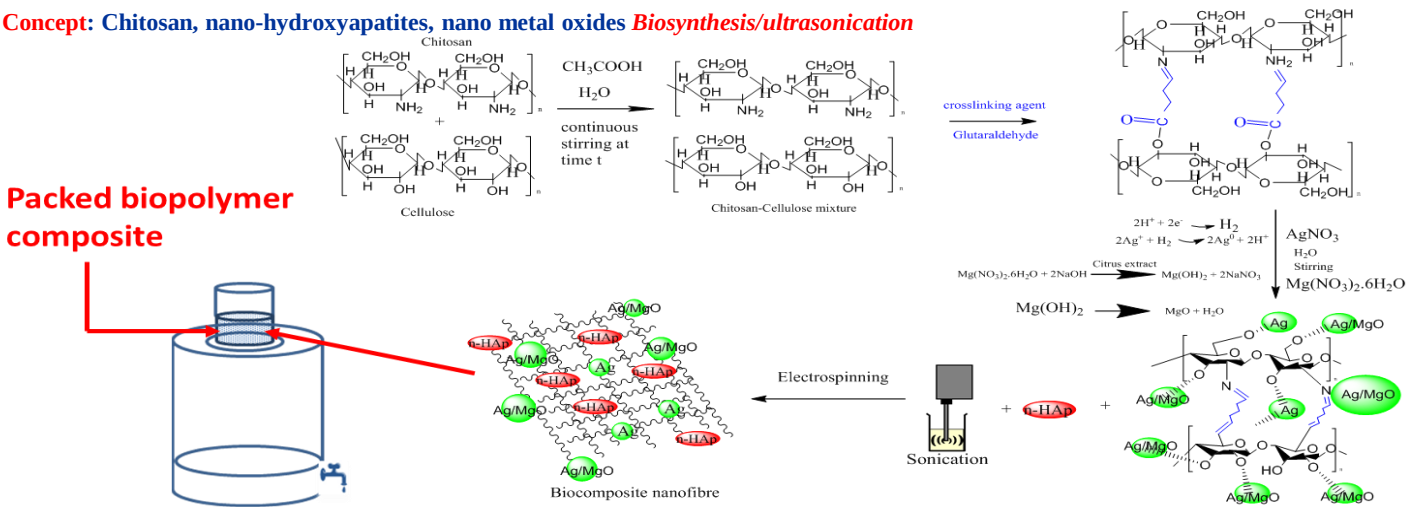
Main Objective

Aim is to fabricate multifunctional biopolymer-metal oxide nanoparticle reinforced composites for fluoride and pathogen removal in groundwater. This biopolymer composite is envisaged to have high fluoride adsorption capacity and simultaneously remove pathogens resulting in powerful treatment system to deliver fluoride free and safe water for drinking.



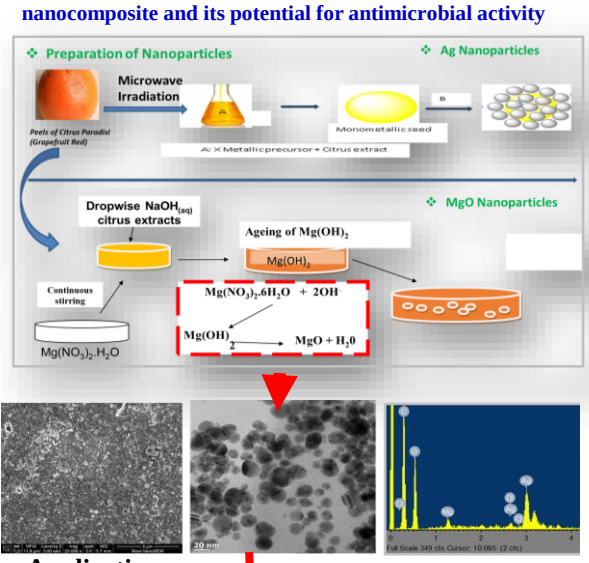
Research Methods

Concept: Chitosan, nano-hydroxyapatites, nano metal oxides *Biosynthesis/ultrasonication*

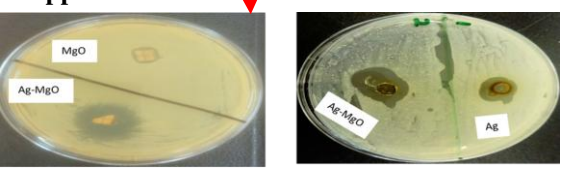


Results: Composite material synthesis and Applications

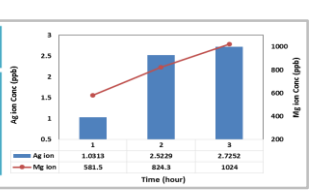
Biosynthesis of ultrasonically modified Ag-MgO nanocomposite and its potential for antimicrobial activity



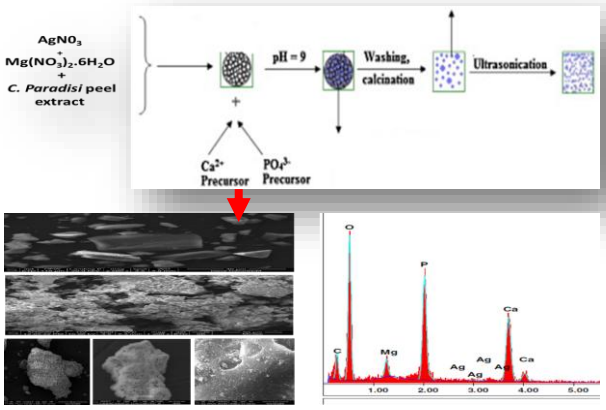
Application



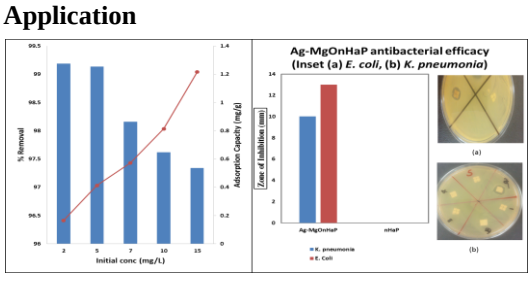
Methods	MgO	Ag-MgO
Well diffusion assay (mm)	9	22
MIC (µg/mL)	80	20



Green Synthesis of Ag/MgO nanoparticle modified nanohydroxyapatite and its potential for defluoridation and pathogen removal in groundwater



Application



Results

- A green method has been successfully employed for the synthesis of the Ag-MgO nanoparticles
- The adsorbents have exhibited high fluoride and pathogen removal in groundwater
- Further extensive tests are planned

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