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Development of sensor for fluoride detection and defluoridation of drinking water through Nano-Biotechnology approach

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Water scarcity is considered as a major crisis of the 21st century. It is reported that in 2015 approximately 663 million people lack access to safe drinking water worldwide. Fluoride (F) is a major contributor to the world water crisis affecting about 200 million people worldwide. The rural population is more prone to F contamination as in some places, the available techniques are neither acquainted nor affordable. The fluorosis is reported more prevalent in rural population due to excess F contaminated water inevitably consumed by the rural population. F is known to cause mottled enamel, osteoporosis, crippling skeletal fluorosis, kidney imbalance and in severe cases leading to mortality. Several methods have been developed to efficiently remove F from water including nanofiltration (NF), reverse osmosis (RO), forward osmosis (FO), coagulation, ion exchange and adsorption. The cost and effectiveness of the defluoridation techniques are still not satisfactory and thus required further improvements. My talk will cover mainly the development of biosensor, colorimetric sensor and hybrid hydrogel composites for defluoridation technology that has been done in my lab. Biosensors consist of a biological entity that can be an enzyme, antibody or nucleic acid that interacts with F and produces the signal that is measured electronically. Other than this, highly sensitive carbon quantum dots (CQDs) based colorimetric detectors for F ions will be mentioned. It will also include the 3D graphene oxide-based hybrid hydrogel, CNT based novel composites and NP-PUF pouches for F remediation from drinking water. Along with this, nano-phytoremediation of F by Prosopis juliflora through the application of Fe_3O_4 NPs will be discussed. Simultaneously, I will give you the insight about our center activities and goals of "Center for Excellence on Water and Energy" of Banasthali Vidyapith, Rajasthan, India. Brief outline of my current going projects and future plan.

Speaker Biography

Suphiya Khan is working as an associate professor in the department of bioscience and biotechnology, Banasthali University, India. Recently her Water and Health Laboratory launched D-Flo Aqua Remedies and Company Ltd. She has fourteen years of teaching and research experience. Her strong background mainly relates to water research which special focus on Fluoride remediation, synthesis of different nonmaterial, DNA fingerprinting, chemoprofiling and Fluoride(F) phytoremediation technology. Recently, she was the finalist in the National Bioentrepreneurship competition 2017 conducted by BIRAC-C-camp. She has received various awards viz DBT-research associateship, young scientist by ISGBRD, ICAR, recognition award for research and teaching and Indian National Academy of Sciences (INSA) international visiting scientist fellowship. She has selected as INSA visiting scientist for Turkey. She has been awarded as a principle investigator and coinvestigator in various projects duly funded by UGC, MHRD, DST and DBT. Currently, she is handling Center of excellence on Water and Energy which is duly funded by MHRD with 2.5 crore rupees. Her work has been recognized internationally at various scientific conferences and journals.

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