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Potential of Nanotechnology based water treatment solutions for the improvement of drinking water supplies in developing countries

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Over the last decades explosive population growth in the world has led to water scarcity across the globe putting additional pressure already scarce ground water resources and is pushing scientists and researchers to come up with new alternatives to monitor and treat water for use by mankind and for food security. Nearly 4 billion people around the world are known to lack access to clean water supply. Systematic water quality data is important for the assessment of health risks as well as for developing appropriate and affordable technologies for waste and drinking water treatments, and long-term decision making policy against water quality management. Traditional water treatment technologies are generally chemical-intensive processes requiring extremely large infrastructural support thus limiting their effective applications in developing nations which creates an artificial barrier to the application of technological solutions for the provision of clean water. Nanotechnology-based systems are in retrospect, smaller, energy and resource efficient. Economic impact assessment of the implementation of nanotechnology in water treatment and studies on cost-effectiveness and environmental and social impacts is of key importance prior to its wide spread acceptance. Government agencies and inter-governmental bodies driving research and development activities need to measure the effective potential of nanotechnology as a solution to global water challenges in order to effectively engage in fiscal, economic and social issues at national and international levels for different types of source waters with new national and international initiatives on nanotechnology and water need to be launched. Environmental pollution and industrialization in global scale is further leading to pollution of available water sources and thus hygienically friendly purification technologies are the need of the hour. Thus cost-effective treatment of pollutants for the transformation of hazardous substances into benign forms that can potentially be addressed through Nanotechnology based filters utilizing photocatalytic or electrocatalytic systems could be further explored. Development of these techniques together with other superadsorbants would make it possible to install delocalized systems with very little capital investment and operation and maintenance costs suitable for installation in less developed countries.