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The role of nanotechnology in treated wastewater recycling and reuse

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Recycling and reuse of the nonconventional water resources such as wastewater is a practical solution to water shortages. The treatment level and the effluent quality are still open questions. Subject to the climate changes, randomized and limited precipitation and over pumping of groundwater reduces the chances that scarcity issues will be solved. Floods water hardly fills the increasing gap between supply and demand. The regions suffering from water scarcity and shortage in food will probably continue to stay under the increased umbrella of scarcity unless special and big measures will be undertaken. A promising solution is to desalinate low quality waters such as sea water, saline groundwater and wastewater, applying nanotechnology (Reverse Osmosis processes). Conventional treatment methods can remove neither the contained dissolved solids nor the micro pollutants. The effect of domestic wastewater after conventional treatment methods and subsequently by nanotechnology is a promising solution. Although the main nanotechnology desalination suffers from adverse phenomena such as high energy demand, fouling associated with decreased flow rates and brine disposal is the promising solution for coming times. Field experiments were conducted in a typical arid zone (precipitation around 150 mm/year). The four years of experiments and different annual agricultural crops were cultivated in 0.6-hectare plots. The yield was monitored every growing season in each of the six treatments conducted. Each effluent quality and the operating parameters of the nanotechnology system such as Trans membrane pressure, retentate and recirculation flow-rates including salinity effects on productivity of agricultural crops were continuously monitored. The membrane system was monitored as well. The effects of water quality expressed mainly by the electrical conductivity (EC) of the effluent were considered and monitored. A preliminary economic analysis was conducted, examining the effects of water and energy consumption on fouling and the efficiency of the effluent application.

Biography

Gideon Oron has completed his studies in the Technion-Israel Institute of Technology (All three degrees). After his DSc graduation, he has spent one year for his Post-Doctoral in Ft. Collins, Colorado, USA. Upon his return to Israel, he has joined Blaustein Institute for Desert Research in Sde-Boker, Ben-Gurion University of the Negev. There, he works on issues related to water and non-conventional water resources in arid zone, field work and management modelling. Looking into optimization issues allows him to tackle large scale water problems. He has published close to 150 refereed reviewed articles in the leading world journals.

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