

Salty groundwater treatment: Recovery of magnetic nano-particles

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The motivation of this research arises from the fact that Magnetic nano-particles (MNP) are under development by Masdar Institute of Science and Technology (MIST)-Massachusetts Institute of Technology (MIT) project for novel salty water treatment process. MNP will absorb the water from the salty water via Forward Osmosis (FO) concept and the recovery of the water from the MNP, only requires low temperature thermal energy. This project presents the use of Photovoltaic (PV) cooling that leads, on one hand, to an increase of PV efficiency and electrical energy productivity, whereas the recovered cooling thermal energy, on the other hand, will be used for MNP water recovery. The MNP recovery/pure water production process studied is Humidification Dehumidification (HDH) process. A numerical model has been developed using a MATLAB program to study the system's performance under the climatic conditions of Abu Dhabi, United Arab Emirates. The results include the system's temperatures, water productivity and system's effectiveness. For Abu Dhabi climatic conditions, the results show that the PV cooling produces about 4 liters of pure water per meter squared of PV panel per day, with PV overall (electrical/thermal) effectiveness of close to 78% at peak sun-hours in the summer.

Biography

Adewale O. Giwa was born in Ogun State, Nigeria on 22nd September, 1984. He obtained his B.Sc. degree in Chemical Engineering from ObafemiAwolowo University, Nigeria in 2007. He is currently a Post Graduate student at Masdar Institute of Science and Technology in the Water and Environmental Engineering Program. He has research interest in water treatment through the use of renewable energy and membrane purification.

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