CLEANING WATER USING NANOTECHNOLOGY, ADVANCED OXIDATION AND FILTRATION PROCESSES[1]

FALARAS P.

NCSR Demokritos, Institute of Nanoscience and Nanotechnology, Neapoleos and Patriarchou Grigoriou, Agia Paraskevi Attikis, 15310, Greece

New hazardous pollutants of emerging concern including industrial and pharmaceutical compounds, toxins, hormones and pathogenic microorganisms appear in water. There is a need for worldwide coordinated water research aiming at pollutants abatement in order to protect human beings, animals, vegetation and environment. In this direction, the development and implementation of innovative technologies for their elimination are of the highest priorities for the protection of the environment and the world's survival. In this work, a new methodology was conceived and implemented, following a holistic approach going from the level of the nanomaterials synthesis to device design and manufacture, passing through process engineering and optimization. An innovative and efficient water detoxification nanotechnology for the destruction of extremely hazardous emerging pollutants in natural waters and water supplies was developed, by taking advantage of solar light and environmentally friendly, innovative titania photocatalysts combined with ceramic and composite membranes. The new technology, by contrast to conventional separation methods, focuses on advanced oxidation processes with global environmental applications and brings about the photocatalytic degradation of contaminants during the filtration process. It thus permits water purification and water quality enhancement under normal solar light conditions, with high efficiency and low cost.

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[1] Invited speech