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Water Purification at rural areas using nanomaterials under solar radiation

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Safe drinking water and sustainable sanitation are essential for the human being. However, water scarcity is among the main problems facing the world currently. Almost 40% of the world's population live in areas impacted by insufficient water supply, and two thirds of us is projected to suffer from water scarcity by the year 2025. The most affected will be people living in low income countries. Lack of clean water is both a natural and a human-caused problem, since water resources are generally managed in an unsustainable way characterized by pollution, wastefulness, and uneven distribution. Technical solutions are required to ensure sufficient water resources to meet present and future needs, developing technologies for water purification which are effective, robust, and easy to use and maintain at a low cost is an important step towards decentralizing clean water and increasing people's access to it. Although an improvement has been consistently observed within the time, it is seen that its improvement is reduced, because there is usually a limited access to energy, lack or limited access to chemical reagents, poorly trained technical staff and generally inadequate roads. Not to mention that the developed technology must be socially accepted. A technology that has caught a lot of scientific attention lately is the photocatalytic degradation of pollutants in water. A photocatalyst is defined as a material which is activated by adsorbing a photon and is capable of accelerating a reaction without being consumed. The interest in the technology for photocatalytic degradation of pollutants is mainly due to its suitability potential for rural areas because of its low cost, easy implementation, and use of the UV-A component of the solar radiation as energy input. In this work, we will do a review of global and our own experience in the fabrication and characterization of photocatalytic supported nanomaterials for water purification, strategies followed to implement during cloudy days. Considering our experience, the growth of TiO_2, ZnO (0-3D) nano-structures fixed onto rigid and flexible substrates will be shown [1-6]. All of these materials will be discussed as a function of the main parameters used in their preparation and their ability to photocatalytically eliminate bacteria in water. Studies were performed in the laboratory as well as at a greenfield site. For long term on-site experiments, for example, bacteria decontamination under real conditions, has been successfully tested at rural places using solar irradiated photocatalytic prototypes. With these studies, it was demonstrated the feasibility to obtain water disinfection by using supported photocatalytic nanomaterials illuminating it with solar radiation and makes us optimistic for the development of robust technologies for water.

Keywords: Photocatalysis, Water purification, Zinc Oxide, titanium oxide, spray pyrolysis, sol-gel, electrosppining

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