Photocatalytic Enhancement for Solar Disinfection of Water: A Review

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It is estimated that 884 million people lack access to improved water supplies. Many more are forced to rely on supplies that are microbiologically unsafe, resulting in a higher risk of waterborne diseases, including typhoid, hepatitis, polio, and cholera. Due to poor sanitation and lack of clean drinking water, there are around 4 billion cases of diarrhea each year resulting in 2.2 million deaths, most of these are children under five. While conventional interventions to improve water supplies are effective, there is increasing interest in household-based interventions to produce safe drinking water at an affordable cost for developing regions. Solar disinfection (SODIS) is a simple and low cost technique used to disinfect drinking water, where water is placed in transparent containers and exposed to sunlight for 6 hours. There are a number of parameters which affect the efficacy of SODIS, including the solar irradiance, the quality of the water, and the nature of the contamination. One approach to SODIS enhancement is the use of semiconductor photocatalysis to produce highly reactive species that can destroy organic pollutants and inactivate water pathogens. This paper presents a critical review concerning semiconductor photocatalysis as a potential enhancement technology for solar disinfection of water.