

Sustainable Drinking Water Treatment Method Using Solar Light

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Abstract : Solar photocatalysis has the potential to treat drinking water in a sustainable and cost effective manner. According to WHO, there should not be any colony forming units (CFU) per 100 mL present in drinking water, and as per the Central Pollution Control Board (CPCB) of India, the bathing water should have less than 500 CFU/100 mL and the maximum permissible limit is 2500 CFU/100 mL. In this study, 8 water sources near our collaborators, Indian Institute of Technology, Kharagpur, India, were analysed, and it was found that 6 out of 8 sources of water had significant coliform count in them. Two of them were chosen to be treated by solar photocatalysis a) well water which had a count of 4800 CFU/100 mL for total coliforms and was used by people for drinking purposes, and b) pond water which had a count of 92000 CFU/100 mL for total coliforms and 3000 CFU/mL for E.Coli and was used by people for washing and bathing purposes. In this study, a semiconductor-semiconductor, composite BTO-TiO₂-RMSG & TiO₂-SiO₂ were tested for their ability to be activated under solar light and to reduce Total Coliforms and E.Coli bacteria in real world contaminated water, and it was found that both catalysts were both able to reduce the total coliform count in water by 99.7% and 98.2 % in 2 hrs respectively. They have also shown promising results in reusability tests. This study demonstrates the ability of solar photocatalysis to be used in real world drinking water treatment and will promote future advancements in this field.

Keywords : sustainable water treatment, waterpurification technologies, water policies, water pollution and environmental engineering

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