Paper ID: 17196
oral
student

SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FAR FUTURE (D4)
Poster Session (P)

Author: Mr. INNOCENT UDOM
University of South Florida, United States

PHOTOCATALYTIC APPLICATION OF ZINC OXIDE NANOWIRES FOR GREEN SPACE EXPLORATION

Abstract

Of particular interest for space missions is the potential applicability of photocatalysis for the decomposition of organics in order to mitigate potential health and environmental problems in the controlled environment of a spacecraft or space station, particularly for long-term manned missions. One resource common to all manned missions in the immediate future is an abundance of sunlight, which presents an opportunity to use concentrated sunlight, through the use of solar concentrators, to possibly enhance or augment photocatalytic process(es). Among the various technologies, the potential applicability of photocatalysis, to decompose organic waste and inactivate a wide range of harmful microorganisms to benign products, is of a particular interest and viable solution. Although TiO2 a commonly studied photocatalyst, ZnO is found to be an alternative nanomaterial semiconductor for photocatalyst because of lower commercial cost and higher efficiency. The solar energy utilization efficiency could be improved by modifying the ZnO nanowire through doping of transition metals. In this work, ZnO nanowires were doped with silver on glass substrate through hydrothermal method and screened for the decomposition of methyl orange, MO (a model contaminate) under UV and visible irradiation. Characterization of the synthesized doped photocatalysts were performed using scanning electron microscopy (SEM) and X-ray diffraction analysis (XRD) for morphology and crystallinity, respectively. Brunhauer, Emmettt and Teller (BET) analysis measured mass-specific surface area; while UV-Vis absorbance spectra were acquired using Fourier transforms infrared spectroscopy (FTIR). Photocatalytic performance of ZnO and ZnO/Ag nanowires were obtained and compared to P25 titanium oxide (TiO2) for decomposition of MO. interestingly, in 2 hr ZnO and ZnO/Ag under UV irradiation revealed photodegradation efficiencies of 78