Semiconductor photocatalysis for life-support systems on the moon

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Abstract

Over the past decade, photocatalysis with semiconductor dispersions has received much attention and practical applications have been realized in the decontamination of water, sacrificial hydrogen production and extraction of metals. As the lunar surface has abundant UV radiation (necessary to sensitize high-band-gap, stable semiconductor catalysts), it is suggested that photocatalytic processes could be conveniently adopted on a lunar base. A specific example of detoxification of water in a photosynthetic culture medium is discussed. When the aquatic plant *Lemna major* is grown repeatedly in the same culture medium (nutrient concentration kept constant), the standing biomass progressively decreases. However, if the culture medium used is exposed to sunlight in the presence of TiO_2, a standing biomass close to the first cycle is maintained.