

Anatase/rutile/brookite mixed TiO₂ nanotubes for carbon dioxide reduction

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A manned spacecraft environmental control and life support system (ECLSS) is a group of systems that allow human to live in space for long term exploration. Generally ECLSS consists of several main components such as, atmosphere revitalizations (CO₂ removal/reduction, O₂ generation/supply, trace contaminant monitoring and control, microorganism control), water recovery and managements (water storage & distribution, water recovery, water quality monitoring). In this study anatase/rutile/brookite mixed TiO₂ nanotubes were prepared and tested for different parts of the ECLSS. In first step photocatalytic oxygen generation using TiO₂ nanotubes with IrO₂ nanoparticles coated optical fibers will be performed. In second and third step CO₂ photoreduction and water purification systems using anatase/rutile/brookite mixed TiO₂ nanotubes coated optical fibers will be developed and tested, respectively. In fourth step, air purification systems will be developed. In final step anatase/rutile/brookite mixed TiO₂ nanotubes coated optical fibers in cylinder type reactor will be employed to develop anti-contaminant and antibacterial systems.