

New Materials

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Interfacial Solar Vapor Generations: Physics, Materials and Applications

Abstract

Water scarcity is one of the most pressing global challenges. Nanomaterials with carefully tailored properties can be used to manipulate the flow of phonons, electrons and photons, to enable unconventional solution to addressing this issue. In this talk, I will present our recent progress in interfacial solar vapor generation and its related applications.

We report that efficient and broad-band plasmonic absorber can be fabricated through a three dimensional self-assembly process. Because of its efficient light absorption and strong field enhancement, it can enable very efficient ($>90\%$) solar vapor generations. Inspired by the transpiration process in plants, we report an artificial transpiration device with a unique design of two dimensional water path. The energy transfer efficiency of this artificial transpiration device is independent of water quantity and can be achieved without extra optical or thermal supporting systems, therefore significantly improve the scalability and feasibility of this technology. At the end, we would like to demonstrate that this type of interfacial solar vapor generations can have direct implications in various fields such as desalination, sterilization and power generations.