Ultrathin Assembles of Porous Array for Enhanced H2 Evolution

## ABSTRACT

Since the complexity of photocatalyst synthesis process and high cost of noble cocatalyst leftovers a major hurdle to producing hydrogen (H2) from water, a noble metal-free Ni-Si/MgO photocatalyst was realized for the frst time to generate H2 efectively under illumination with visible light. The catalyst was produced by means of simple one-pot solid reaction using self-designed metal reactor. The physiochemical properties of photocatalyst were identifed by XRD, FESEM, HRTEM, EDX, UVvisible, XPS, GC and PL. The photocatalytic activities of Ni-Si/MgO photocatalyst at diferent nickel concentrations were evaluated without adjusting pH, applied voltage, sacrifcial agent or electron donor. The ultrathin-nanosheet with hierarchically porous structure of catalyst was found to exhibit higher photocatalytic H2 production than hexagonal nanorods structured catalyst, which suggests that the randomly branched nanosheets are more active surface to increase the light-harvesting efciency due to its short electron difusion path. The catalyst exhibited remarkable performance reaching up to 714 μmolh−1 which is higher among the predominant semiconductor catalyst. The results demonstrated that the photocatalytic reaction irradiated under visible light illumination through the production of hydrogen and hydroxyl radicals on metals. The outcome indicates an important step forward one-pot facile approach to prepare noble ultrathin photocatalyst for hydrogen production from water