

Co-doping schemes to enhance H₂ evolution under visible light irradiation over SrTiO₃:Ni/M
(M [La or Ta]) prepared by spray pyrolysis

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Two photocatalysts, SrTiO₃:Ni/La and SrTiO₃:Ni/Ta, were prepared by continuous spray pyrolysis. The effects of the co-dopants on hydrogen evolution over the uncalcined photocatalysts were evaluated under visible light irradiation. The co-doping of La³⁺ into SrTiO₃:Ni transformed the charge structure and increased the presence of Ni²⁺ at the expense of Ni³⁺ in the host lattice structure. The co-doping of Ta⁵⁺ into SrTiO₃:Ni also increased the Ni²⁺/Ni³⁺ ratio around the Ti⁴⁺ ions. Compared with SrTiO₃:Ni, SrTiO₃:Ni/La showed a 3 times greater rate of hydrogen evolution under visible light irradiation and SrTiO₃:Ni/Ta, a 4 times greater rate. The co-doping levels required for optimized hydrogen evolution over SrTiO₃:Ni/La and SrTiO₃:Ni/Ta prepared by spray pyrolysis were smaller than those prepared by other methods. Spray pyrolysis also produced particles with large surface areas and high roughnesses.