Prepatation of N-doped Strontium niobium oxide for the photocatalytic water splitting

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A layered perovskite Sr2Nb2O7 was reported to be an efficient photocatalyst for water splitting under UV light irradiation. Nitrogen doping turned this material into a photocatalyst active for water splitting under visible light irradiation (>400 nm). Sr2Nb2O7-xNx catalysts were synthesized from a Sr2Nb2O7 precursor at 973 ~ 1273 K for 3 hr under NH3 flow (100 sccm). The catalyst obtained by nitriding Sr2Nb2O7 at 1073 K for 3 hr had the highest activity under visible light irradiation. Amount of a doped nitrogen increased as nitridation temperature increased. An excess N-doping induced the collapse of the layered structure of parent oxide. The obtained new crystal structure, SrNbO2N (oxynitride) was less active as photocatalyst for water splitting under visible light irradiation. This the optimum structure of the catalyst showing the maximum hydrogen production rate was the one that maintaining the layered structure of Sr2Nb2O7, with a part of its oxygen was replaced with nitrogen.