# Photocatalytic Water Splitting under Visible Light Irradiation by $Na_{1-x}M_xTaO_3$ (M = Ru, Rh, Ir, Pt, Pd) Powder Prepared by Spray Pyrolysis

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Significant attention has been focused on the hydrogen production by photocatalytic water splitting with powdered metal oxide semiconductor photocatalysts. $NaTaO_3$ has been regarded as one of the promising photocatalyst for water splitting, since it has shown remarkable water splitting rate under UV light irradiation. But, visible light driven photocatalysts are needed to convert solar energy into hydrogen energy. In this study, novel metal dopants such as Ru, Rh, Ir, Pt, Pd were doped on $NaTaO_3$ to drive photocatalytic activity for water splitting under visible light irradiation. Submicron and spherical $Na_{1-x}M_xTaO_3$ (M = Ru, Rh, Ir, Pt, Pd) powders were prepared by spray pyrolysis process at lower temperature and shorter reaction time than conventional solid state reaction. Characteristics of $Na_{1-x}M_xTaO_3$ (M = Ru, Rh, Ir, Pt, Pd) powders were analyzed by SEM, XRD and DRS. Hydrogen production rates from photocatalytic water splitting under visible light irradiation ($\lambda$ > 415 nm) were measured by a reaction system which was composed of 300 W Xe lamp, GC and batch type reactor.