

Supporting Information

Design of nitrogen-doped layered tantalates for non-sacrificial and selective hydrogen evolution from water under visible light

H. Suzuki,^a O. Tomita,^a M. Higashi^a and R. Abe*^{a, b}

^a *Department of Energy and Hydrocarbon Chemistry, Graduate School of Engineering, Kyoto University, Katsura, Nishikyo-ku, Kyoto 615-8510, Japan*

^b *JST-CREST, Sanbancho 5, Chiyoda-ku, Tokyo 102-0075, Japan*

**E-mail: ryu-abe@scl.kyoto-u.ac.jp*

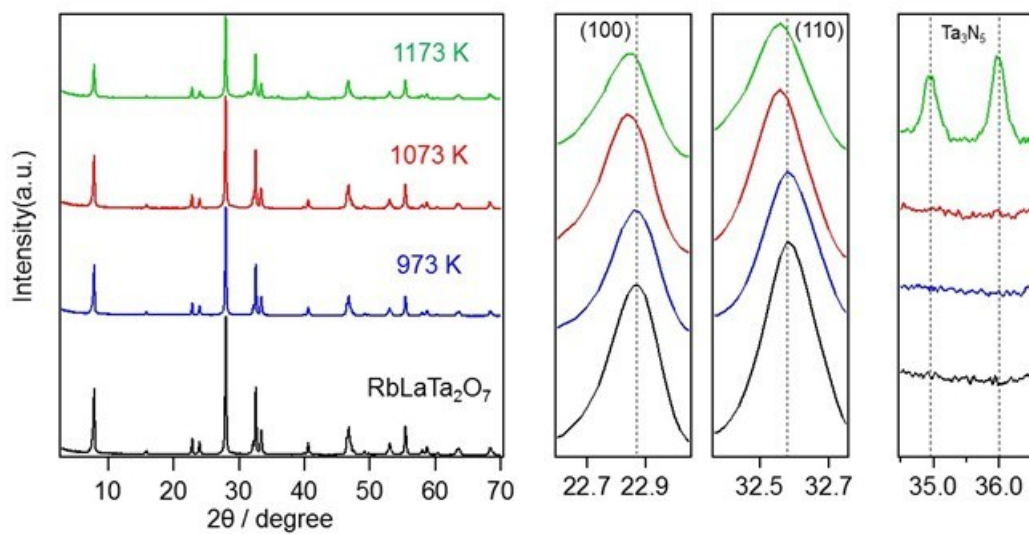


Fig. S1 XRD patterns of $\text{RbLaTa}_2\text{O}_7$ before and after heating under NH_3 flow at 973–1173 K for 6 h.

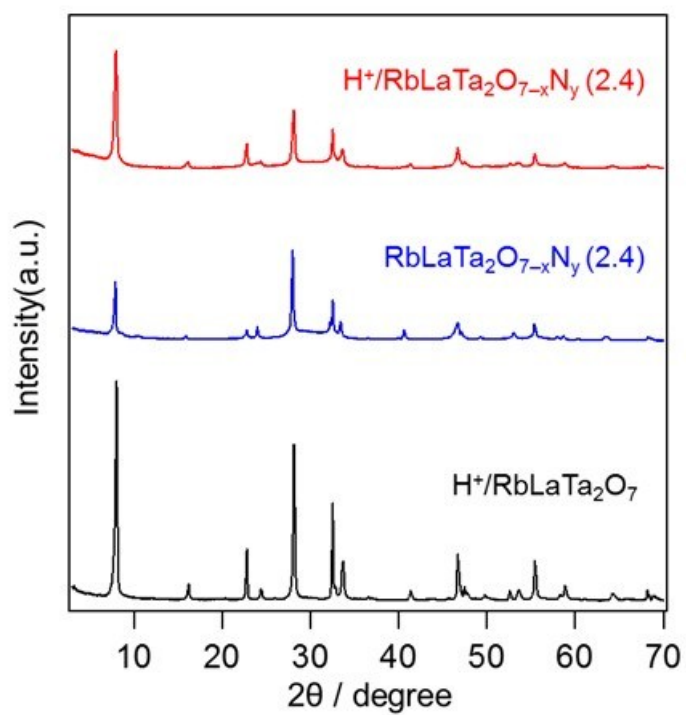


Fig. S2 XRD patterns of $\text{H}^+/\text{RbLaTa}_2\text{O}_7$, $\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (2.4) and $\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (2.4).

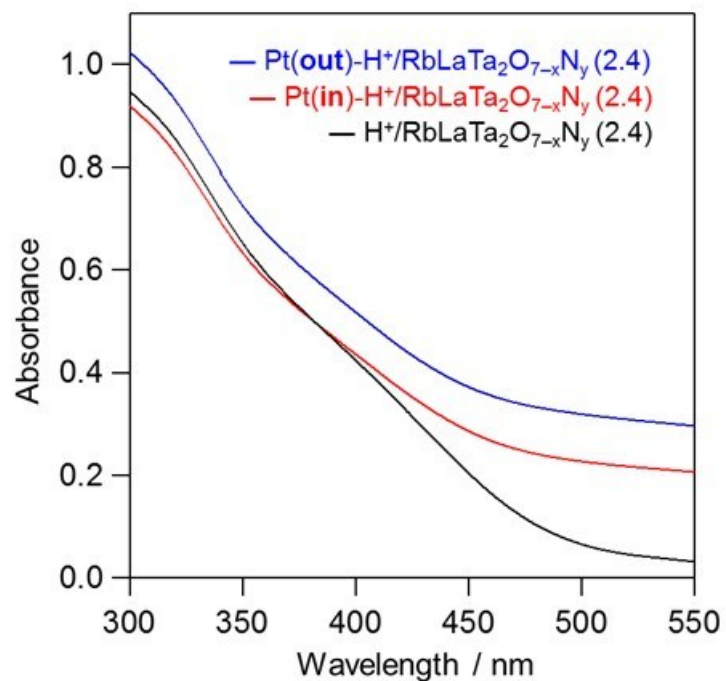


Fig. S3 Diffuse reflectance spectra of $\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (2.4), $\text{Pt(in)}-\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (2.4) and $\text{Pt(out)}-\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (2.4).

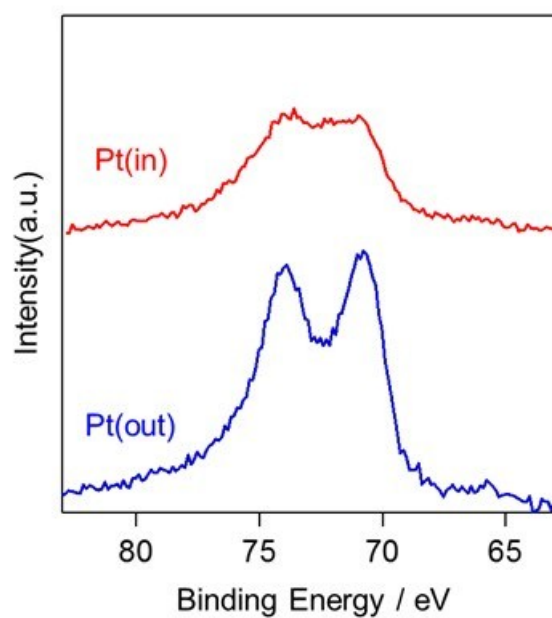


Fig. S4 XPS spectra of $\text{Pt(in)}-\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (Rb: 2.4), and $\text{Pt(out)}-\text{H}^+/\text{RbLaTa}_2\text{O}_{7-x}\text{N}_y$ (Rb: 2.4).

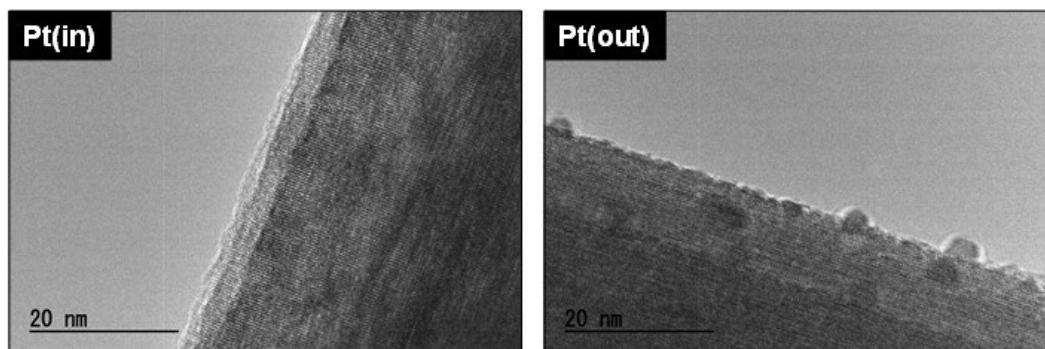


Fig. S5 TEM images of Pt(in) and Pt(out)-H⁺/RbLaTa₂O_{7-x}N_y (2.4).

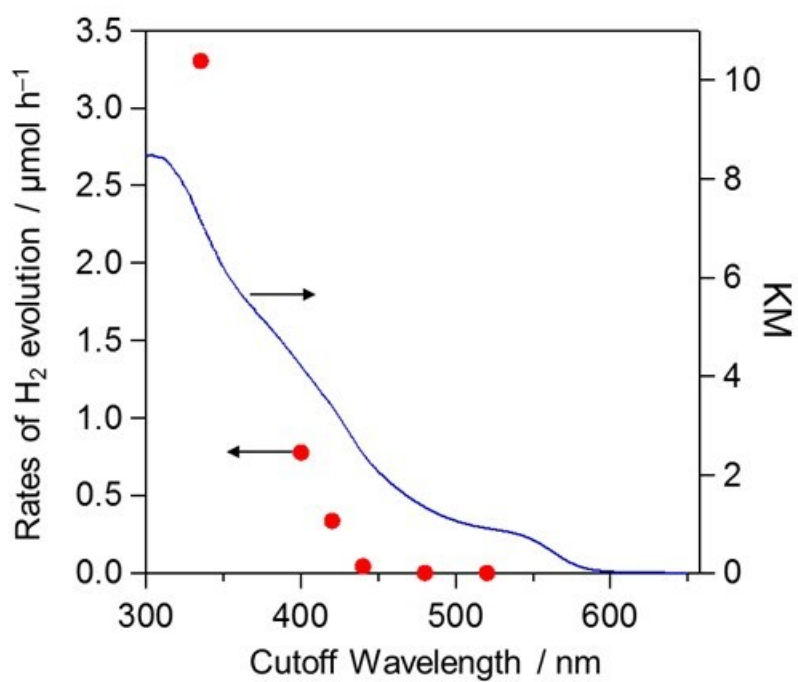


Fig. S6 Diffuse reflectance spectra of H⁺/RbLaTa₂O_{7-x}N_y (1.2) and rates of H₂ evolution over Pt(in)-H⁺/RbLaTa₂O_{7-x}N_y (1.2) from MeOH aqueous solution (Xe lamp, cut off filter: U-35, L-42, Y-44, Y-46, Y-50, O-54).

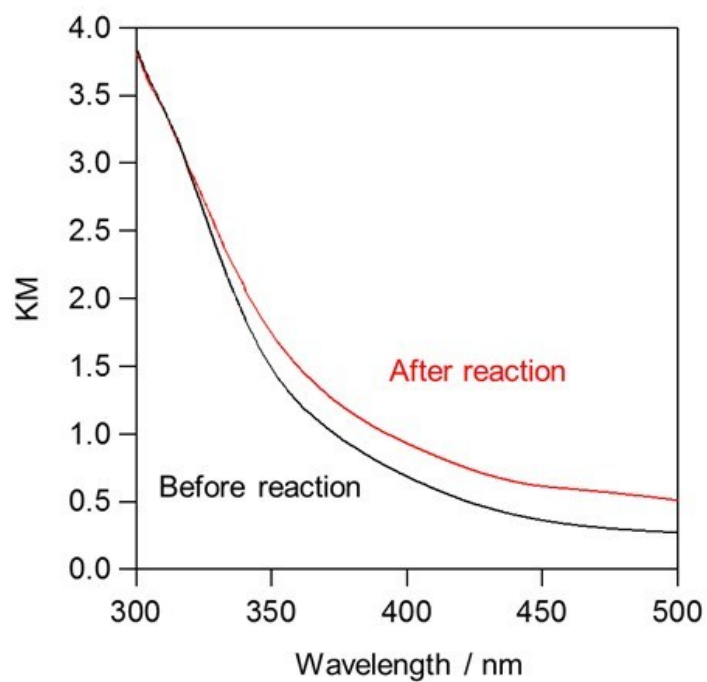


Fig. S7 Diffuse reflectance spectra of Pt(in)-H⁺/RbLaTa₂O_{7-x}N_y (2.4) before and after H₂ evolution from 0.1 M KI aqueous solution.

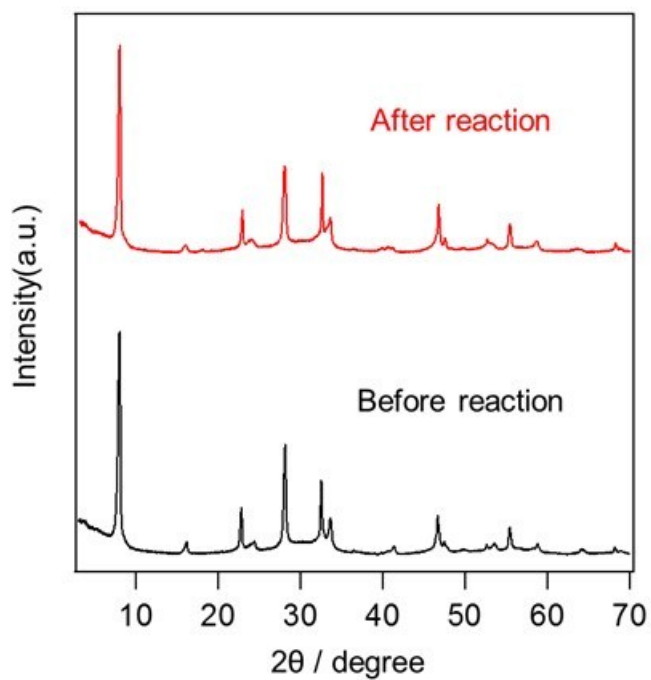


Fig. S8 XRD patterns of Pt(in)-H⁺/RbLaTa₂O_{7-x}N_y (2.4) before and after H₂ evolution from 0.1 M KI aqueous solution.