

Electronic Supplementary Information

Molten salt-assisted α -axis oriented growth of Ta_3N_5 nanorod array with enhanced charge transport for efficient photoelectrochemical water oxidation

Zhan Shi,^{a,c} Zhe Xu,^{a,b} Jianyong Feng,^{a,b} Huiting Huang,^{a,b} Qinfeng Qian,^{a,b} Shicheng Yan^{*a,b} and Zhigang Zou^{a,b,c}

^aCollaborative Innovation Center of Advanced Microstructures, Nanjing University, Nanjing, 210093, P. R. China. E-mail: yscfei@nju.edu.cn

^bEco-materials and Renewable Energy Research Center (ERERC), National Laboratory of Solid State Microstructures, College of Engineering and Applied Science, Nanjing University, Nanjing 210093, P. R. China.

^cJiangsu Key Laboratory For Nano Technology, Department of Physics, Nanjing University, Nanjing, 210093, P. R. China.

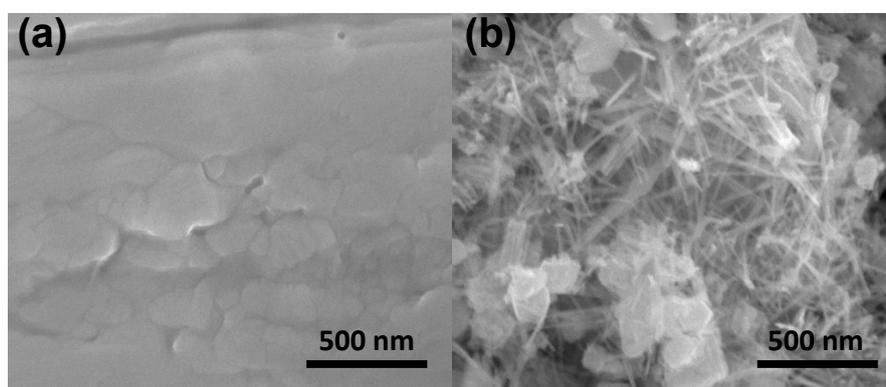


Fig. S1 a) SEM image of the pre-oxidized Ta foil. b) SEM image of NR powder fabricated by Ta_2O_5 powder and KI flux.

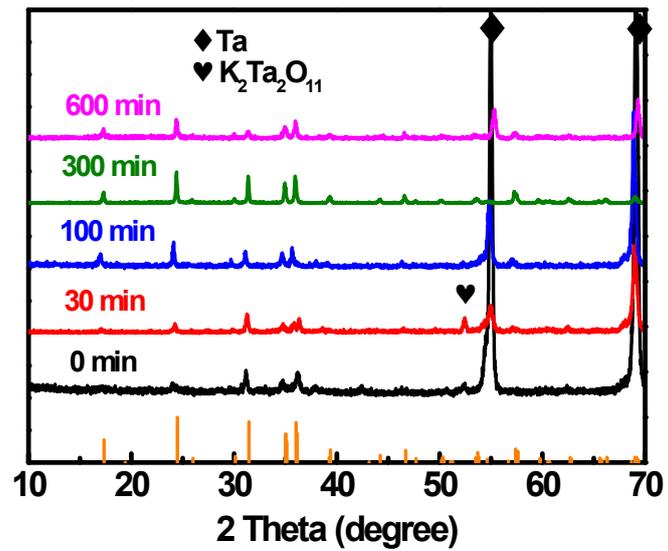


Fig. S2 XRD patterns of the time-course experiment of the NR growth using 2 g KI flux.

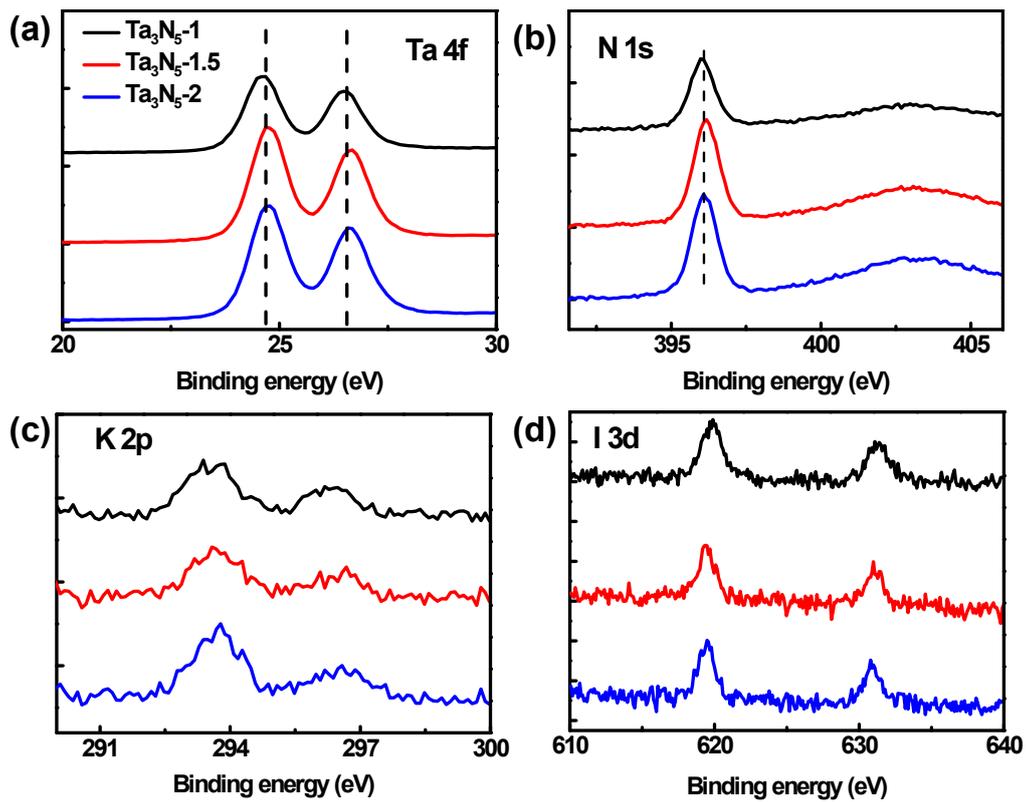


Fig. S3 XPS spectra of a) Ta 4f b) N 1s c) K 2p d) I 3d of the as-synthesized photoanodes.

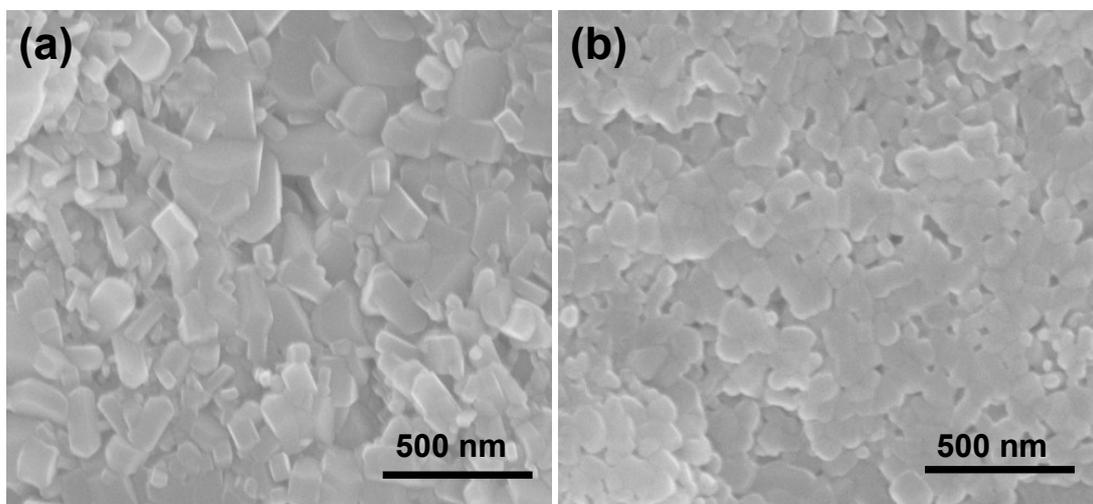


Fig. S4 SEM images of Ta₃N₅ photoanodes synthesized by using a) NaI and b) KBr as flux.

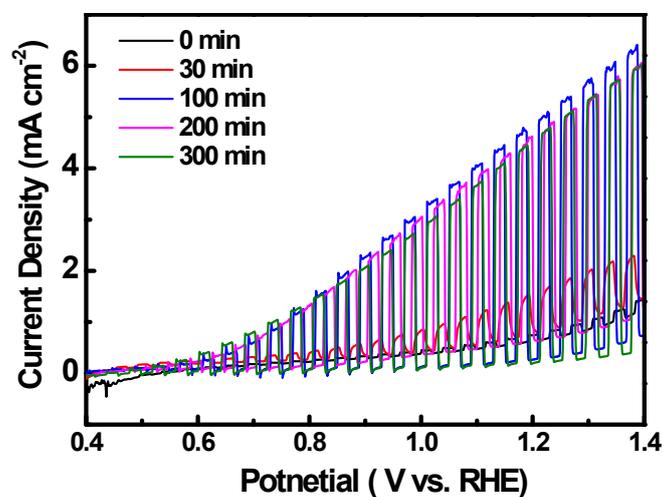


Fig. S5 Current density-potential curves of Ta₃N₅-2 photoanodes with varied growth time. Ni_{0.9}Fe_{0.1}OOH was electrochemically deposited for 100 s as the co-catalyst for all the photoanodes.

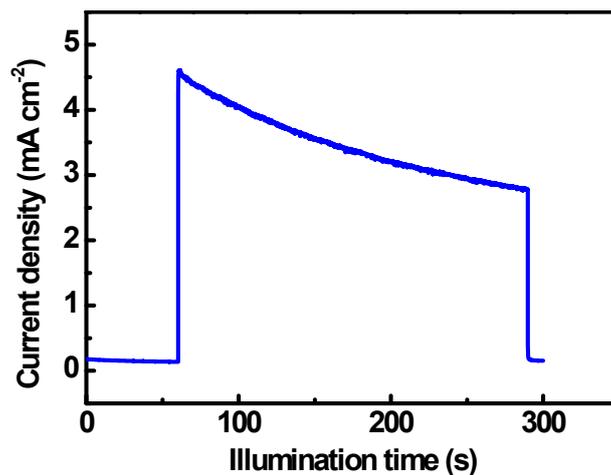


Fig. S6 Stability test of Ta₃N₅-2 photoanode with Ni_{0.9}Fe_{0.1}OOH. The stability of Ta₃N₅-2 nanorod photoanode is not so good, which can be attributed to the surface corrosion by holes and leaky co-catalyst that does not prevent from the infiltration of electrolyte.

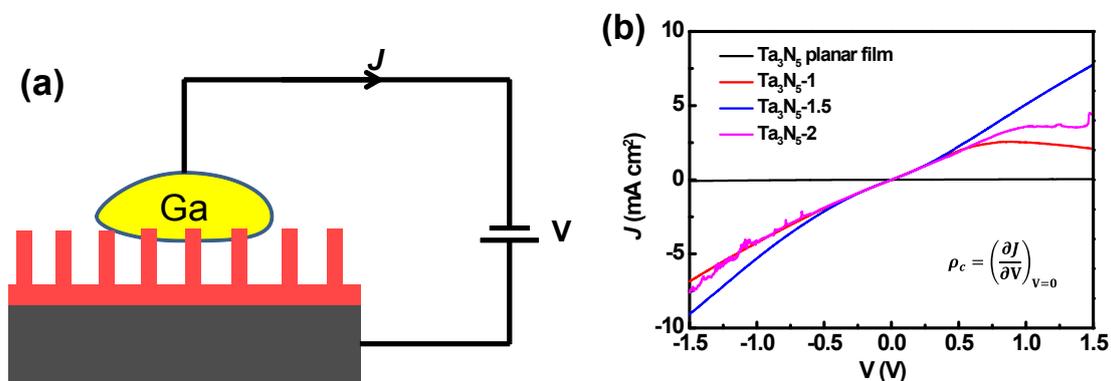


Fig. S7 a) Schematic diagram of conductivity measurement of Ta₃N₅ photoanodes. The area of Ga droplet is about 4 mm². b) J - V curves of the conductivity

measurement. For comparison, a planar nanoparticle Ta_3N_5 film of about 2 μm -thick was fabricated with simple oxidation-nitridation method. The linearly fitted conductivities at $V=0$ V for Ta_3N_5 nanoparticle film, $\text{Ta}_3\text{N}_{5-1}$, $\text{Ta}_3\text{N}_{5-1.5}$ and $\text{Ta}_3\text{N}_{5-2}$ are 0.02, 3.61, 3.46, and 3.58 $\Omega^{-1} \text{cm}^2$, respectively.