37－35　Electrochemical approach to evaluate the mechanism of photocatalytic water splitting on oxide photocatalysts

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Photoelectrochemical measurements of TiO_2, $NaTaO_3$, and Cr or Sb doped TiO_2 and $SrTiO_3$ photocatalysts were carried out in H_2 and O_2 saturated electrolytes in order to evaluate the reverse reactions during water photolysis. The poor activity of TiO_2 as a result of reverse photoreactions of O_2 reduction and H_2 oxidation was revealed with the respective high cathodic and anodic photocurrents. The rise in the photocurrents at $NaTaO_3$ after La doping was in harmony with the doping-induced increase in the photocatalytic activity. NiO loading suppresses the O_2 photoreverse reactions, which declines photocatalytic activity, and/or promotes the photo-oxidation of water, because the O_2 photo-reduction current was scarcely observed near the flatband potential. Photocurrents of O_2 reduction and H_2 oxidation were observed under visible light for the Cr and Sb doped $SrTiO_3$ and TiO_2, respectively. These phenomena are in harmony with the previous reports on the photocatalysts examined with sacrificial reagents.

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