ELECTRONIC PROPERTIES OF PALLADIUM-DOPED POROUS SILICON AND ITS APPLICATION FOR WATER DECOMPOSITION WITHOUT APPLYING ELECTRIC VOLTAGE

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S u m m a r y

The por-Si/p-Si and por-Si/n-Si structures fabricated with the use of an internal current source have been examined by measuring the temperature dependences of their capacitance photovoltage in the temperature interval 100–300 K. The same structures were examined after their doping with Pd in $PdCl_2$ aqueous solutions. The energy bands in the n- and p-Si boundary layers were bent down before doping and became bent up after it. Pd-doping increases the concentration of boundary electronic states (BESs) below the midpoint E_i of the energy gap and decreases it above E_i. It also decreases the hole trap concentration at the por-Si/n-Si interface. The examination of the time dependences of a current, which flows – without application of external voltage – between Pd-doped (or undoped) structures under investigation and a Yb (or Pt) electrode immersed into water, has revealed the water decomposition into OH^- and H^+ ions, which becomes possible owing to the catalytic activity of the Yb and por-Si⟨Pd⟩/n-Si electrodes.