We reported before 1 that Pt nano-dotted n-Si dotted and surface-methylated n-Si electrode.

electrodes showed very high photovoltages (V

efficiency (Figure 3 shows the solar-to-chemical conversion even for 24-h continuous illumination.

dotted and methylated n-Si(111) showed good stability and H-terminated n-Si(111) (0.30 V). Moreover, the Pt-

Si(111) (0.55 V) is much higher than that for the Pt-dotted

deposited electrochemically on the methylated n-Si(111) surface in an aqueous solution of 5 mM K2PtCl6 and 0.1 M LiClO4 at -1.0 V vs. Ag/AgCl (sat. KCl). The electricity passing across the n-Si surface was 83 mC cm-2. Photodecomposition of HI was performed using an electrochemical cell equipped with a methylated and Pt-dotted n-Si electrode and a Pt-plate counter electrode, both immersed in 7.6 M HI / 0.05 M I2 under simulated solar (AM 1.5G, 100 mC cm-2) illumination, with no external bias.

Figure 1 shows SEM images of (a) the Pt-dotted and H-terminated n-Si(111) and (b) the Pt-dotted and methylated n-Si(111) surfaces. Pt was distributed relatively homogeneously all over the n-Si(111) surface. Figure 2 shows photocurrent density (j) vs. potential (U) curves for HI under simulated solar illumination. Interestingly, the Voc for Pt-dotted and methylated n-Si(111) (0.55 V) is much higher than that for the Pt-dotted and H-terminated n-Si(111) (0.30 V). Moreover, the Pt-dotted and methylated n-Si(111) showed good stability even for 24-h continuous illumination.

Figure 3 shows the solar-to-chemical conversion efficiency (φcChn), obtained through photodecomposition of HI into H2 and I2, as a function of the HI concentration / M

Figure 1 SEM images of (a) the Pt-dotted and H-terminated n-Si(111) and (b) the Pt-dotted and methylated n-Si(111) surfaces.

Figure 2 j-U curves (solid and broken curves) for n-Si(111)-CH3/Pt in 7.6 M HI / 0.05 M I2 under simulated solar (AM 1.5G, 100 mC cm-2) illumination, compared with that (dotted curve) for n-Si(111)-H/Pt.

Figure 3 The solar-to-chemical conversion efficiency (φcChn) as a function of the HI concentration.

References

