# Production of $H_2$ by Photocatalytic Water-Splitting on Nanocomposite Semiconductors : CdS:Ni(II)$KNbO_3$

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Efficient hydrogen evolution was photocatalytically achieved by combining CdS with potassium niobate semiconductors, $KNbO_3$ and Ni(II)-doped $KNbO_3$, under visible light ($\lambda > 400$nm) irradiation in a mixed isopropanol/water system. The quantum yields, f, for $H_2$ production with visible light were found to be 4.7% and 0.58% for CdS:Ni$KNbO_3$ and CdS: $KNbO_3$, respectively. 203mmole/hr·g of $H_2$ production rate under (UV+ visible) irradiation(UVis) for CdS:Ni$KNbO_3$ was almost two times higher than that under visible light only, while CdS:$KNbO_3$ under Uvis produced $H_2$ 1.2 times higher than 20.1mmole/hr·g under visible only. The large enhancement in activity due to Ni(II) doping is attributed to substitution of $Ni^{2+}$ for $K^{+1}$ site of $K^{+1}Nb^{+5}O_3$, which induces a slight modification of the basic crystal structure, resulting in enhancement of charge separation and thus higher probabilities of electron transfer to bound protons.

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