Enzymatic hydrogen production using crosslinked enzyme in PEC system

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In this study we have performed an improved hydrogen production using immobilized enzymes on the TiO_2 surface which is enhanced by heterobifunctional crosslinker containing an amine reactive N-hydroxysuccinimide ester and a photoactivatable nitrophenyl azide in PEC system. We consider crosslinked enzyme is more advantageous process than an existing physical adsorption technique owing to forming chemical bonding between enzyme and cathode, and the mentioned process actually revealed much better H_2 production rate. To characterize these electrodes various methods such as AFM and confocal microscopy have been applied. As a result of applying 1.5V solar cell as a external bias and crosslinked enzyme, hydrogen was evolved from the enzymatic PEC system, recording more than 200 μmol of H_2 / (hr×cm^2, ATTE) under the Xe lamp.