

Combinatorial Method for the Rapid Screening of Effects of Ti, Si, and Al Incorporation on the Photoelectrochemical Activity of Iron Oxide

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Abstract

The effect of adding small amounts of Ti, Si, and Al to iron oxide on its photoelectrochemical activities were investigated by a high-throughput combinatorial method. Quantitative ink jet printing is used to pattern iron oxide and dopant precursors onto conductive glass substrate. Subsequent pyrolysis yields electrodes of doped iron oxides, which are easily screened for their photoelectrolysis activity while immersed in an electrolyte by using a simple scanning laser system. When compared to pure iron oxide, the Si, or Al-doped iron oxides were found to exhibit decreased photoelectrolysis activity whereas Ti-doped ones showed an enhanced photocurrent.