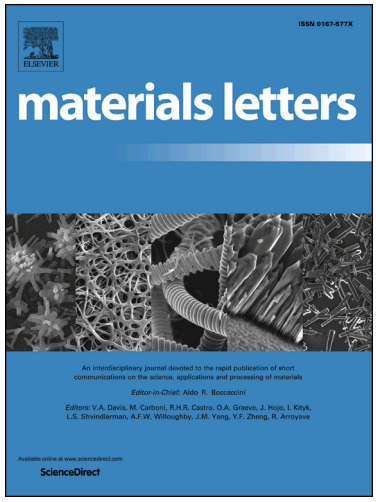

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Simultaneous enhancement in light absorption and charge transportation of bismuth vanadate ($BiVO_4$) photoanode via microwave annealing

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Abstract

We report the crystallization of electrodeposited $BiVO_4$ photoanode by deploying conventional furnace annealing and hybrid microwave annealing, with the latter proving to possess higher crystallinity, charge carrier mobility, light absorption and conduction band level. The crystallization of $BiVO_4$ was improved by microwave annealing, yielding higher charge carrier density. Higher morphological compactness and crystallinity for microwave annealed sample enhanced its light absorption properties. The smaller crystallite sizes upon microwave annealing resulted in band gap augmentation due to quantum confinement effect and manifested itself in its more elevated conduction band. The enhanced intrinsic properties of $BiVO_4$ increased photoelectrochemical performance of microwave annealed sample by approximately two times compared with that of furnace annealed sample. The ultrafast