Electrochemical hydrogen evolution over WO_3 and MoO_3 nanowires produced by microwave-assisted hydrothermal reaction

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Hexagonal WO_3 (hex-WO_3) and orthorhombic MoO3 (o-MoO_3) nanowires with high aspect ratio and crystallinity have been prepared for the first time by a microwave-assisted hydrothermal method. By using XRD, SEM and TEM/HRTEM, phase and morphology of the products were identified. Uniform hex-WO3 and o-MoO3 nanowires were fabricated via the decomposition and unique axial reaction of metal precursors with unprecedentedly high aspect ratios and good crystallinity. These nanowires have displayed outstanding physicochemical properties including the high surface areas and pore volumes. The electrocatalytic activities for hydrogen evolution reaction of hex-WO_3 and o-MoO_3 nanowires have been also investigated by a cyclic voltammetry and linear sweep voltammetry. The results demonstrate that these nanowires are promising electrocatalyst for hydrogen evolution reaction (HER) from water. In addition, the facile vectorial electron transport along the nanowire axis was considered to be responsible for the excellent electrocatalytic activity of the hex-WO_3 and o-MoO_3 nanowires.