MXene as emerging materials for electrochemical energy conversion and storage

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Low-cost non-noble electrode materials are vital for taking the application of electrochemical energy conversion and storage devices to the next level. MXenes, the newest class of two-dimensional materials, are characterised by a high surface area, nanometer layer thickness, and hydrophilicity along with electrical conductivity suggesting them as good alternative for electrocatalysis and energy storage. The main focus of our work is on niobium carbide MXene (Nb-MXene) and its application for electrocatalysis and supercapacitors. Nb-MXene was obtained by chemical synthesis from its MAX phase and characterized in terms of morphology and structure. Its activity for catalysis of hydrogen and oxygen evolution reactions, as well as oxygen reduction reaction, was investigated in different electrolytic media of wide pH range. Finally, capacitance properties of Nb-MXene were also evaluated.

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