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# Core-shell $SrTaO_2N$ nanowire photoanode for photoelectrochemical water oxidation

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Solar fuel generation in the form of hydrogen derived directly from water represents an environment-friendly technology to obtain clean energy. Oxynitrides are promising candidates for photoanodes in water-splitting cells due to their tunable bandgaps and low cost. Especially quaternary oxynitrides exhibit small band gap values, between 1.8 and 2.3 eV, suggesting their potential for high solar-to-hydrogen efficiencies.

Light absorbers in a strongly anisotropic morphology, e.g. nanowires, enable to decouple the long axis responsible for high light harvesting from the orthogonal axis responsible for charge transport. This results in efficient light harvesting while simultaneously ensuring improved charge-carrier conductivity. Most nitrides and oxynitrides are usually obtained in the form of microcrystals by nitridation of a precursor oxide phase. Although $Ta_3N_5$ nanowires can be synthesized by nitridation of Ta2O5 nanowires, this method cannot be applied to quaternary oxynitrides.

The perovskite-related oxynitride $SrTaO_2N$ is a prospective photoanode candidate with favourable band-edge positions. We have synthesized $SrTaO_2N$ nanowires by hydrothermal synthesis on a tantalum substrate and nitridation under flowing ammonia and hydrogen. This is the first trial of a $SrTaO_2N$ photoanode based on nanowires.

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