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Iridium oxide (IrO2) currently represents a state of the art electrocatalyst for anodic oxygen evolution. Since iridium is both expensive and scarce, the future practical application of this process makes it essential to reduce IrO2 loading on the anodes of PEM water electrolysers. In the present study an approach to utilising a suitable electrocatalyst support was followed. Of the materials selected from a literature review, TaC has proved to be stable under the conditions of the accelerated stability test proposed in this study. The test involved dispersing each potential support material in a mixture of trifluoromethanesulfonic acid (TFMSA) and hydrogen peroxide at 130 °C. The liquid phase was subsequently analysed using ICP-MS with respect to the occurrence of ions potentially originating from the support material tested. The TaC support selected was additionally characterised by thermogravimetric and differential thermal analysis to prove its thermal stability. A modified version of the Adams fusion method was used to deposit IrO2 on the support surface. A series of electrocatalysts was prepared with a composition of (IrO2)x(TaC)1−x, where x represents the mass fraction of IrO2 and was equal to 0.1, 0.3, 0.5, 0.7, 0.9 and 1. The thin-film method was used for electrochemical characterisation of the electrocatalysts prepared. SEM–EDX analysis, X-ray diffraction, N2 adsorption (BET) and powder conductivity measurements were used as complementary techniques to complete characterisation of the electrocatalysts prepared. The electrocatalysts with x ≥ 0.5 showed stable specific activity. This result is consistent with the conductivity measurements.

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