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Materials with strong metal-oxide interaction (SMOSI) highly efficient for HOR and tolerant to the presence of CO

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Recently, research in heterogeneous catalysis has mainly focused on SMSI (strong metal support interaction), aiming to enhance both the activity and stability between the metal and the support [1, 2]. In particular the development of anode materials for the PEMFC, driven by the increasing demand for clean and efficient energy suppliers. Approximately 90% of hydrogen produced via thermochemical processes contains impurities such as CO, CO₂, and H₂S, which can significantly reduce the performance of PEMFC anode catalysts. Progress in this area is pivotal for the commercialization of PEMFC systems in applications ranging from residential to heavy-duty mobility.

To address this challenge, a novel synthesis strategy was employed to develop binary and ternary materials comprising tin oxide coupled with Pt and PtRu with different structures in order to promote SMOSI (Strong metal oxide support interaction) [3]. Tin oxide can be used as a support or co-catalyst to boost electrocatalytic performance. Physicochemical characterization methods such as XRD, TEM, and XPS were used to determine the crystallite size, degree of alloying, particle size and distribution, surface and electronic properties of the materials. The electrocatalytic activity was evaluated by cyclic voltammetry, polarization curve and CO stripping in both the absence and presence of a H₂/0.1%CO gas mixture. The addition of tin oxide (SnO₂) to Pt and PtRu reduced the onset potential by 2.8 and 2 times compared with Pt and PtRu catalysts respectively. Poisoning resistance tests monitored by chronoamperometry were also carried out at 20°C and 60°C and.

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