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Microwave-Irradiation Polyol Synthesis of PVP-Protected Pt–Ni Electrocatalysts for Methanol Oxidation Reaction

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ABSTRACT:

Bimetallic Pt–Ni nanoparticles were synthesized for use as electrocatalysts for the methanol oxidation reaction using a costeffective microwave-irradiation synthesis procedure that offers precise temperature control. By varying the concentration of Ni in the Pt matrix, it was demonstrated that the electrocatalytic activity of the particles declined as the Ni content was increased, with a 50:50 Pt:Ni mixture giving the best performance. This in turn showed that the Pt electrocatalytically active surface area was affected by the incorporation of Ni atoms into the Pt lattice. No further calcination of the microwaved catalysts was required resulting in the synthesis of novel and highly active catalysts, which possessed higher activity than some commercially available Pt catalysts. The catalysts also exhibited good CO resistance and long-term stability behavior.