The Effects of Polymer Electrolyte Fuel Cell Fabrication on Pt and Pt alloy Electro catalysts

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There have been numerous studies in the past decade elucidating the effects of fuel cell operating conditions on the degradation of high surface area carbon-supported Pt and Pt alloy nanoparticle electrocatalysts.\textsuperscript{1,2} These studies have mainly utilized \textit{ex situ} microscopy techniques or \textit{in situ} evaluation of electrochemically-active surface area and electrocatalytic activity.\textsuperscript{3} There have been relatively few studies on the effects of the various steps in the membrane-electrode assembly (MEA) preparation process on the physical and chemical properties of the catalyst and on electrochemical utilization of the Pt surface area.\textsuperscript{4}

In this paper we report on studies using small angle X-ray scattering (SAXS), ultra-small angle X-ray scattering (USAXS)\textsuperscript{4}, and X-ray fluorescence spectroscopy (XRF) to determine Pt or alloy particle size, Pt and carbon support particle and agglomerate size, and alloy composition, respectively. The penetrating nature of high energy X-rays allows these properties to be determined not only for the dried catalyst-ionomer inks and for the MEAs, but also for the solvent-containing inks.\textsuperscript{4}

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