STABILITY OF PLATINUM NANOPARTICLES IN FUEL CELLS

Electronics

Effect of solvent polarity

INTRODUCTION

Fuel cells have been extensively studied during these last decades as they appear as environmentally friendly power sources. They convert the chemicals hydrogen and oxygen into water and electricity, *via* a reaction between fuel (on the anode side) and an oxidant (on the cathode side) in the presence of an electrolyte. The reactants flow into the cell, and the reaction products flow out of it, while the electrolyte remains within it. Fuel cells can operate virtually continuously as long as the necessary flows are maintained.

Platinum is typically used as a catalyst to facilitate the chemical reaction in polymer exchange membrane fuel cells (PEMFC). It consists of a dispersion of nanoparticles.

METHOD

In this work, we present three formulations of platinum nanoparticles: formulation 1 consists of 50 nm Pt nanoparticles in water; formulation 2 contains 50 nm Pt particles dispersed in isopropanol (IPA); and finally formulation 3 corresponds to 100 nm Pt/Ru (1:1 wt%) nanoparticles dispersed in IPA. All these products are black colored samples, which have been studied in the Turbiscan LAB at ambient temperature for 5 hours.

RESULTS

Platinum nanoparticles in water

Formulation 1 displays no variation of transmission or backscattering over the 5 hours of analysis (Figure 1), hence proves to be highly stable.

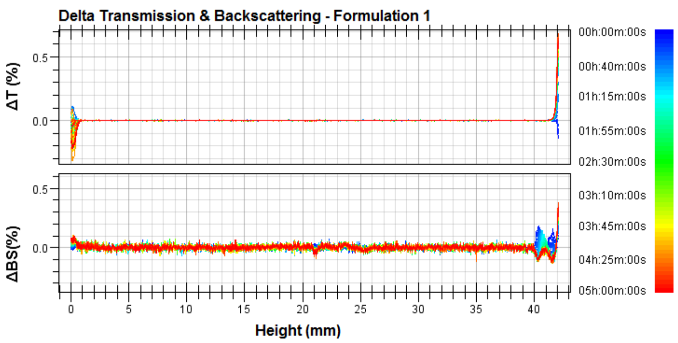

Figure 1: Delta-transmission (top) and backscattering (bottom) for formulation 1 at 25°C.

Platinum nanoparticles in IPA

Formulation 2, on the other hand, is undergoing large sedimentation (Figure 2), with an important increase of the transmission signal towards the top of the sample.

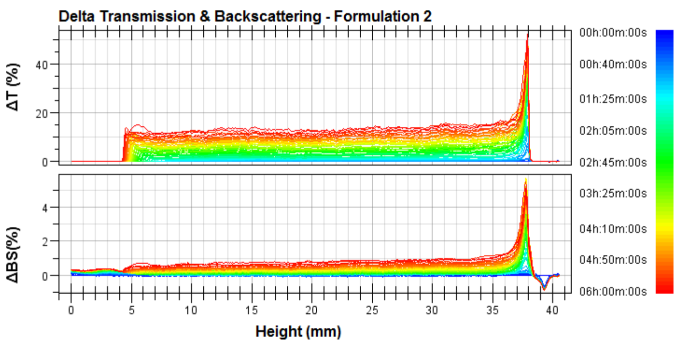

Figure 2: Delta-transmission (top) and backscattering (bottom) for formulation 2 at 25°C.