# Defect Detection in Fuel Cell Gas Diffusion Electrodes using Infrared Thermography

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## Abstract

Polymer Electrolyte Membrane Fuel Cells (PEMFC's) currently suffer poor marketability due to prohibitive costs. The electrode is one of the most expensive components of PEMFC's due to the platinum (Pt) catalyst. Thus, it is vital to minimize scrap during the manufacturing of gas diffusion electrodes (GDEs) by rapid, nondestructive inspection of irregularities or defects. Moreover, defective GDEs may lead to accelerated cell degradation, and potentially stack failure. Here we report on tests of the viability of a manufacturing diagnostic that involved flowing a stoichiometric $H_2/O_2$ gas mixture on to the GDE, which, upon reacting on the Pt catalyst, generates heat. Using infrared (IR) thermography, the temperature profile of the GDE was measured to identify the presence and severity of defects. Experimental results were compared with model predictions of thermal response. Air knife experiments with a moving substrate were conducted to demonstrate the applicability of the diagnostic for moving GDEs, simulating real-time web-line inspection. Temperature data from the air knife experiments have demonstrated detectable thermal responses.