Hysteresis in the solid oxide fuel cell cathode reaction

The oxygen electrode reaction at the Pt/yttria-stabilised zirconia (YSZ) interface is investigated at 1000 degrees C on Pt point electrodes on YSZ and YSZ point contacts on Pt. Linear potential sweeps show a pronounced non-linear current-voltage relation and inductive hysteresis, in particular at low sweep rates (similar to 1 muVs^-1). Correspondingly, an inductive behaviour is observed at low frequency by impedance measurements on polarised electrodes. The behaviour is attributed to a current-induced activation mechanism and subsequent deactivation at equilibrium conditions. Several mechanisms are discussed and rejected as responsible for the phenomena. Finally, the stability of the triple phase boundary is questioned and a current-sensitive reaction zone geometry is suggested as an explanation for the behaviour.