Electrochemical reaction kinetics at the electrodes of Solid Oxide Cells (SOCs) were investigated at 700 °C for two cells with different fuel electrode microstructures as well as on a third cell with a reduced active electrode area. Three fuel mixtures were investigated – hydrogen/steam and reformate fuels hydrogen/carbon-dioxide and hydrogen/methane/steam. It was found that the kinetics at the fuel electrode were exactly the same in both reformates. The hydrogen/steam fuel displayed slightly faster kinetics than the reformate fuels. Furthermore the gas conversion impedance in the hydrogen/steam fuel split into two processes with opposing temperature behavior in the reformate fuels. An 87.5% reduction in active electrode area diminishes the gas conversion impedance in the hydrogen/steam fuel at high fuel flow rates. In both reformates, the second and third lowest frequency processes merged into a single process as the gas conversion was reduced. The SOC with finer electrode microstructure displayed improved kinetics.