Voltammetric study of one-step electrochemical methane production during water and CO2 co-electrolysis in molten CsH2PO4

Cyclic voltammetry was performed with a nickel electrode in molten CsH2PO4 at 350°C and at approximately 25bar of water pressure. The effect of adding carbon dioxide was examined. It is found that even small amounts of CO2 (partial pressure below 0.2bar at 350°C, corresponding to 0.5bar at 22°C of a 5:1 mixture of N2:CO2) have a pronounced effect on the cyclic voltammetry curves. Under these conditions the hydrogen formation is substituted by another process, methane formation. At the same time the cathodic current increased by a factor of 4–6, meaning that the ease of methanisation was much improved.