

Production of carbon via Electrochemical conversion of CO₂ in carbonate based Molten Salt

Abstract

Carbon was successfully deposited on AISI 304 stainless steel rod cathode through electrolysis process in three molten salt mixtures, namely K₂CO₃-Li₂CO₃ (mole ratio: 1:1), CaCO₃-Li₂CO₃-LiCl (mole ratio 0.09:0.28:0.63) and CaCO₃-CaCl₂-KCl-LiCl (mole ratio: 0.13:0.31:0.10:0.45), under CO₂ atmospheres as continuous source of carbon. The process were carried out for 1 hour at temperature range 545–585°C and electrolysis voltage of 4.0V to drive the deposition of carbon through electrochemical conversion. EDX analysis on deposited products shown carbon as dominant element (89-98%). SEM revealed carbon with Flakes and grapes aggregation shapes for different salt mixtures. The achieved current efficiency of 83.8%, 80.46% and 92.41% were found in the respective salt mixtures, and energy consumption promotes several ways for efficiency improvement on the electrochemical conversion of CO₂.