

Synthesis, Characterization and Densification for 10GDC Powders via Sol-gel, Mixed sol-salt and Co-precipitation: A Comparative Study

L. H. Luo ^a, S. H. Ng ^b, A.I.Y. Tok ^{a*}, & F.Y.C. Boey ^a

a: *School of Materials Eng., Nanyang Technological University Singapore 639798, Singapore.* b: *AMR International Corp Singapore RO*

E-mail: MIYTok@ntu.edu.sg

ABSTRACT

The present work is aimed at fabricating high quality, dense 10GDC electrolyte for solid oxide fuel cells using three routes. 10GDC nano-particles were synthesized via sol-gel, mixed sol-salt and co-precipitation. Three routes of spray drying, freeze drying and oven drying were used to convert the sols into dry gel. These calcined 10GDC powders were densified using different sintering methods including SPS (Spark Plasma Sintering), Plasma Spraying (PS) and traditional sintering methods. The work focused on a comparative study: synthesis, characterization and consolidation for the 10GDC powders synthesized via three methods. The phases of precursor and powders were measured using XRD. The morphology and size of sol and powders, the surface and fracture of the sintered pellets were observed under TEM, SEM and FSEM respectively. The relatively densities of the sintered pellets were determined by Archimedes' method.

Keywords: Synthesis, Characterization, Consolidation, 10GDC Powder, SOFC