11th International Conference on Advanced Materials
ICAM2009 Rio de Janeiro Brazil September 20 - 25

ADVANCED MANUFACTURING METHODS OF CELLS AND STACK-COMPONENTS FOR SOLID OXIDE FUEL CELLS

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During the last years a substantial improvement of cell and stack performance can be seen at all main SOFC developers worldwide. Therefore a commercialisation of SOFC-based highly efficient energy conversion systems moves closer. To succeed in the near future on one hand side the further enhancement of the key components under real operation conditions is necessary and on the other hand a distinct cost reduction of the complete system must be realized. The latter objective can be obtained by consequent implementation of large-scale production methods and adjustment of these processing routes to the specific SOFC requirements (Fig. 1).

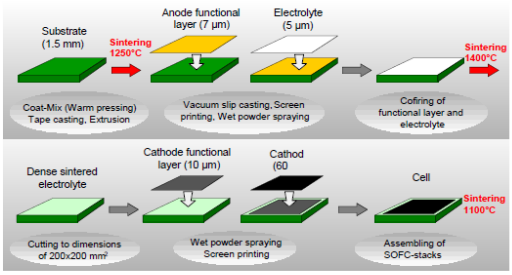

Fig 1: State of the art processing of planar anode supported solid oxide fuel cells
Source: Forschungszentrum Jülich, Jülich, Germany

The presentation will give an overview about the state-of-the-art processing methods (Fig 2) followed by a more detailed discussion of the possibilities and today's limitations of advanced production methods to build up a complex structure of porous and dense layers of ceramic and metallic materials. Under future cost effective manufacturing methods physical vapour deposition, plasma spraying as well as roll coating (Fig. 3) are of special interest. Therefore these techniques are investigated and described in detail.

Source: CeramTec Comp.

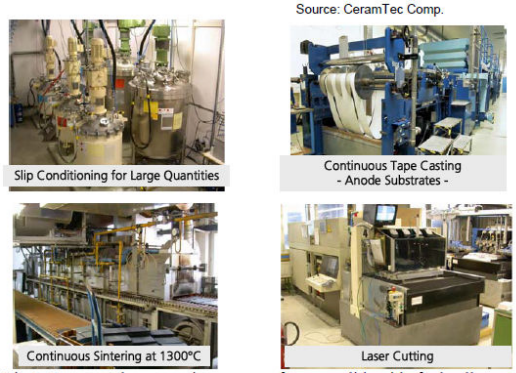

Fig.2: Large scale processing to manufacture solid oxide fuel cells
(Source: CeramTec Comp. Plochingen, Germany

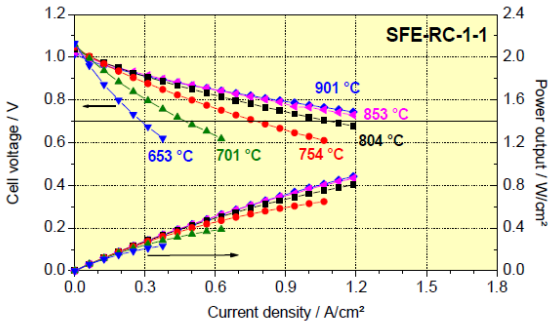

Fig. 3: Electro chemical behaviour and power output of a first series roll coated electrolytes o.n top of 100 x 140 mm² solid oxide fuel cell substrates.

Finally a comparison and evaluation of these new or modified processing methods is given.