COBRA – 621193

COBRA, consortium of European industrials and scientists, has been initiated to study new manufacturing methods and coating concepts for metal bipolar plates and demonstrate their interest for Fuel cell systems in real life conditions.

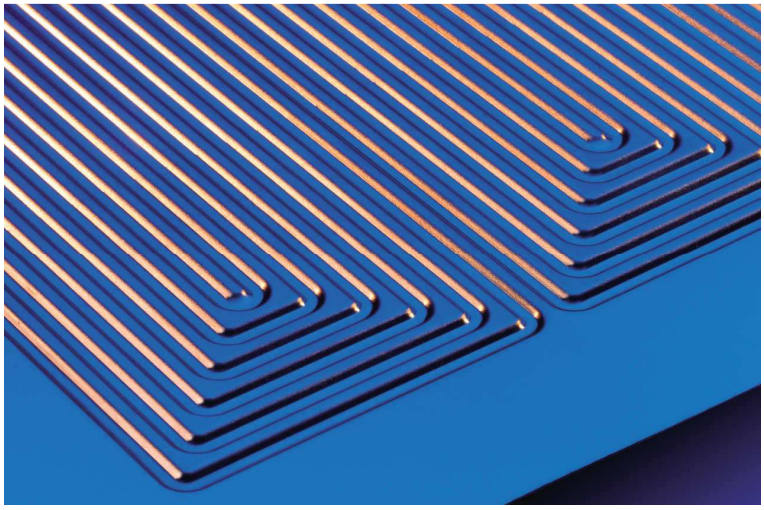

Fig 1: Metallic bipolar plates flow fields

The bipolar plate is presently, by weight, volume and cost, one of the most significant components of a fuel cell stack. Bipolar plates can be made from various materials with the most common ones being graphite, metal, carbon/carbon and carbon/polymer composites.
However, from the automotive OEM's point of view, two main targets are mandatory for the vitality of the fuel cell vehicle market: fuel cell stack and system compactness (<2kW/kg and <2kW/L) and fuel cell system cost (<50€/kW for 500000 fuel cell systems per year).
The only way to reach these targets is to use metallic bipolar plate for automotive fuel cell stacks and most of the automotive OEM's have already chosen this technological option. The higher strength of metallic bipolar plates allows for higher power density stacks, which is desirable especially for transportation applications. Furthermore, metallic plates have a low thermal mass and high thermal conductivity, which is particularly beneficial for efficient cooling and rapid start-up. However, while metallic plate can have excellent electrical bulk conductivity and be produced via inexpensive manufacturing methods, a major drawback is often the need for a corrosion resistant conductive coating: any manufacturing technologies and new coating for bipolar plates should be consistent with the objective cost targets.
The project is supported by the 7th Framework Programme of the European Commission in the context of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) public private partnership. It has a budget of €3.8 million over 3 years and the consortium comprises the following 6 organizations:

1. Commissariat à l'énergie atomique et aux energies alternatives (CEA), France (Co-ordinator)
2. Borit NV, Belgium
3. Impact Coatings AB, Sweden
4. SymbioFCell SA (SFC), France
5. IK4-CIDETEC, Spain
6. Institut National des Sciences Appliquées de Lyon (INSA), France

The COBRA proposal represents a mature approach towards reaching the technical and commercial targets of bipolar plates for automotive stack development based on the 2013 AIP targets. The COBRA project is providing the following specific benefits:
- Bipolar plate specifications based on agreed OEM system requirements;
- Performance and durability compatible with the stringent requirements of the automotive industry;
- Post-mortem studies, phenomena modeling and ageing simulation will be conducted;
- Development is tested in operating conditions and verified in detail on component, cell, and stack level by highly skilled research institutes and industrial partners;
- Marine and Automotive conditions will be tested on-field with operating fuel cell systems.

Fig 2: SymbioFC electrical vehicle Fuel cell range extender

Fig 3: Zero CO2 sail boat operated by CEA

The ultimate target of the COBRA project is the establishment of a European response to the global technology progress by providing competitive bipolar plates that can be accessed and shared by several OEM's for their individual system integration work and mobility platforms. COBRA will moreover benchmark innovative processes and component solutions to further reduce bipolar plate and stack cost. The technical development work will be accompanied by a detailed cost analysis using tools established for the industry involved in mobility.