European Fuel Cell Car Workshop | March, 1st - 3rd 2017, Orléans, France

Use of Carbone Nanotube as catalyst support in PEMFC

P.-A. Jacques[a], M. Heitzmann[a], E. Remy[a], Y. Thomas[a], Daniel Garcia-Sanchez[b], Stefan Hemly[b]
[a]Univertité Grenoble Alpes, CEA-LITEN/DEHT, 17 rue des martyrs 38000 Grenoble, France.
[b]Institute of Engineering Thermodynamics, German Aerospace Center, Pfaffenwaldring 38-40, 70569 Stuttgart, Germany

pierre-andre.jacques@cea.fr

Keywords: Carbone Nanotube, catalyst nanostructuration, core-shell, ageing tets.

The corrosion of the active of the membrane electrode assembly (MEA) is one a factor which impact the durability of the PEMFC. The more commonly used catalysts are based on Platinum nanoparticles supported on Vulcan types carbon (Pt/C). But those catalysts which give high beginning of life performance surfer from both carbon corrosion by releasing CO_2 or CO (which a poison for the catalyst), and Pt corrosion which lead to Pt leaching and finally loss of ECSA.
To address that issue, carbone nanotube (CNT) has been used as catalyst support. In order to obtain a catalyst matching with the PEMFC specifications (high ECSA, high support and catalyst stability, scalability, integration in MEA) both the CNT support and the catalyst preparation have been optimized. Both catalysts have been developed to address either the anode (fig 1) or the cathode side.
The presentation is reporting the *ex situ* and *in situ* characterization of the catalyst (electrochemical, TEM, SEM) as well as tolerance toward degradation test performed in 25 cm^2 single cell (fig 2). An emphasis will be put on the anodic active layer degradation. Indeed the integration of Pt/NTC at the anode side showed a better tolerance toward loss of electrochemical surface area (ECSA) of that electrode and more specifically for bus application.

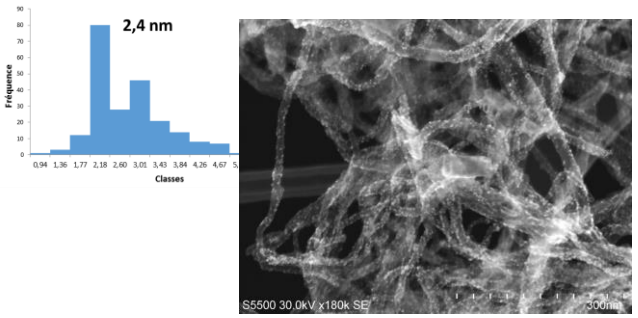

Fig 1: *SEM image of Pt/NTC and histogram of the reparation of the particles sizes*

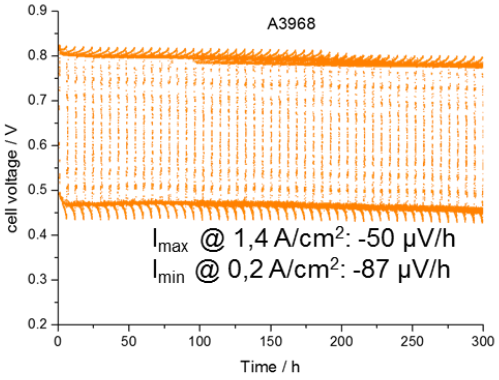

Fig 2 : *evolution of MEA performance using an Imin/I max cycle in 25 cm2 single cell*

Acknowledgements
The results has been obtain in the FCH-JU Nano-CAT (GA 325239).