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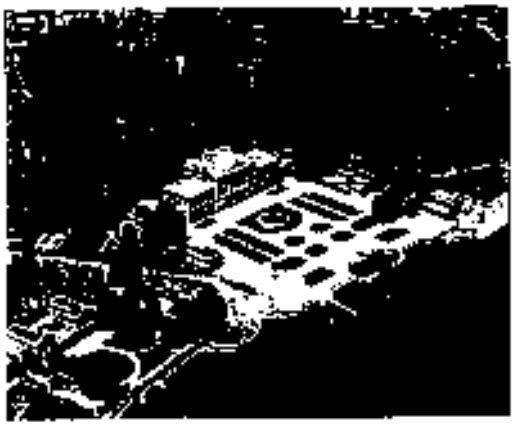

PROGRAMME

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A NOVEL METHOD TO PREPARE ELECTROCATALYSTS FOR POLYMER ELECTROLYTE FUEL CELL

M. De Francesco, A. Pozio, R. F. Silva, L. Giorgi, F. Cardellini

ENEA, C.R. Casaccia, Via Anguillarese 301, 00060, S. Maria di Galeria (Rome), Italy

A new method for preparing high surface Pt/C and Pt-Ru/C catalysts at low temperature is described [1]. Platinum on carbon was prepared from carbonaceous material, H_2PtCl_6 and sodium formiate as reducing agent while Pt-Ru/C was prepared always on carbon support but using $Pt(NH_3)_4Cl_2/RuNO(NO_3)_x(OH)_y$ and borohydride as reducing agents. In both cases a very fast reduction process of the metal was used by means of a microwave furnace. Small and homogeneously dispersed catalyst particles were obtained. XRD and electrochemical measurements show that the performance of catalysts prepared was similar to those of commercial one but with increased stability [2]. In particular long-term test carried out on Pt/C in a polymer electrolyte fuel cell for thousands of hours showed very good performance.

The microwave treatment allows a very fast reduction kinetic of metal ions, with reduced thermal and diffusive gradients, and permits the production of more homogeneous catalysts. The process results with lower cost respect to the traditional ones and appears to be easily scaled up to manufacture level.

Main characteristics of the process (Fig.1) can be pointed out:

- metal precursors, reducing agents and carbon support are homogeneously and intimately mixed at room temperature in a highly stable single bath;
- a very fast thermal treatment is provided by means of microwave irradiation. In less than one minute the temperature is increased up to 100 °C;
- thermal and concentration gradients are avoided in the suspension and small catalyst particles are obtained.

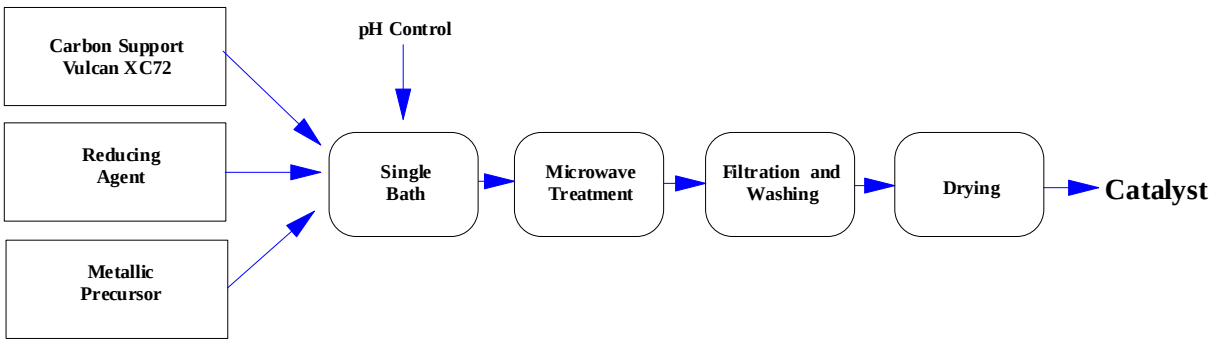

Fig. 1 – Flow diagram of the catalyst preparative process.

References:

[1] M. De Francesco, F. Cardellini, A. Cemmi, L. Giorgi, A. Pozio, EU Patent N°RM2002A000087, 2002.

[2] A. Pozio, M. De Francesco, A. Cemmi, F. Cardellini, L. Giorgi, *J. Power Source*, **105**, (2002), 13-19.