**Electronic Supplementary Information (ESI)**

**RSC Advances**

# Electrochemical preparation of Fe oxide-based catalysts for the synthesis of nanocarbons

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**Contents**

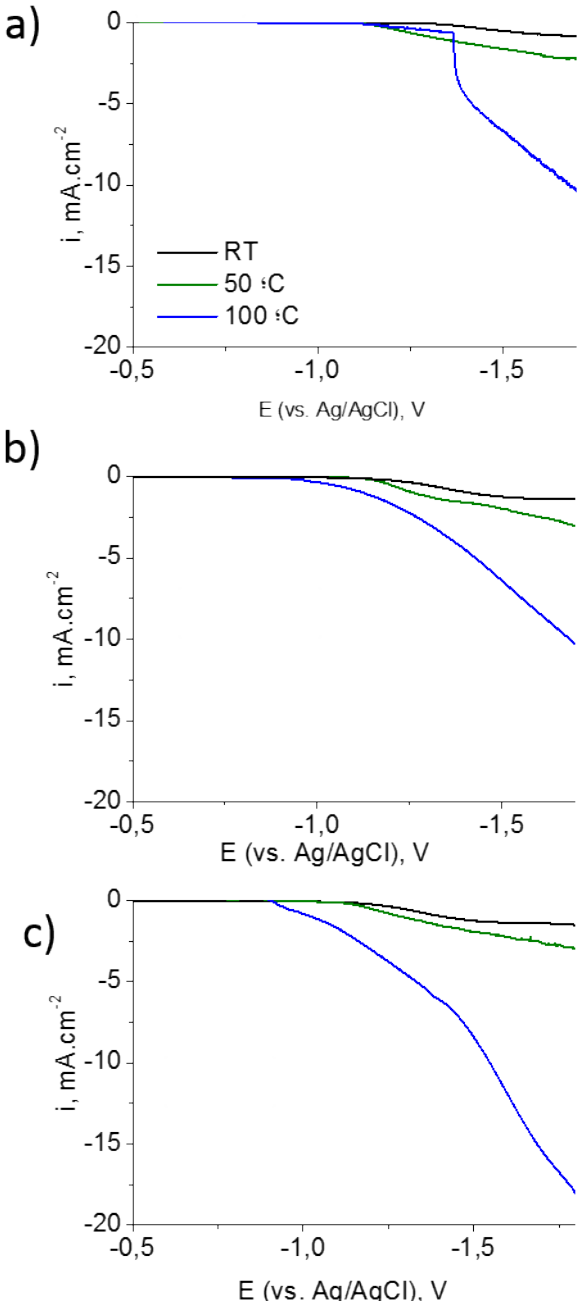


Fig. 1S Linear sweep voltammetry for (a) anhydrous $FeCl_2$, $Fe(NO_3)_3.9H_2O$ and $FeCl_3.6H_2O$ baths at room temperature, 50 ºC and 100 ºC. The working electrode is the Al-Mg mesh, the counter is a platinum foil and the reference electrode is the standard Ag/AgCl.

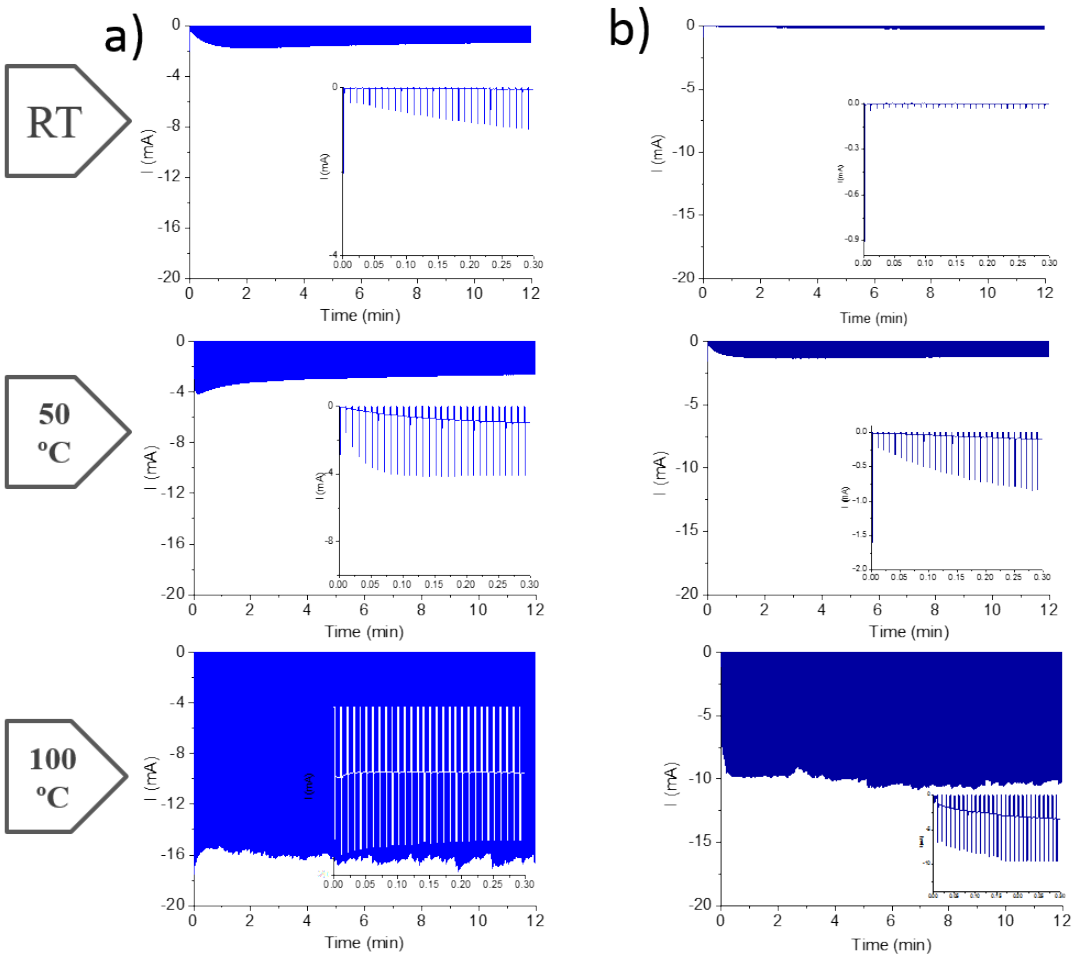


Fig. 2S Potentiostatic current-time transients for (a) $FeCl_3.6H_2O$ and (b) $Fe(NO_3)_3.9H_2O$ baths at room temperature, 50 ºC and 100 ºC.

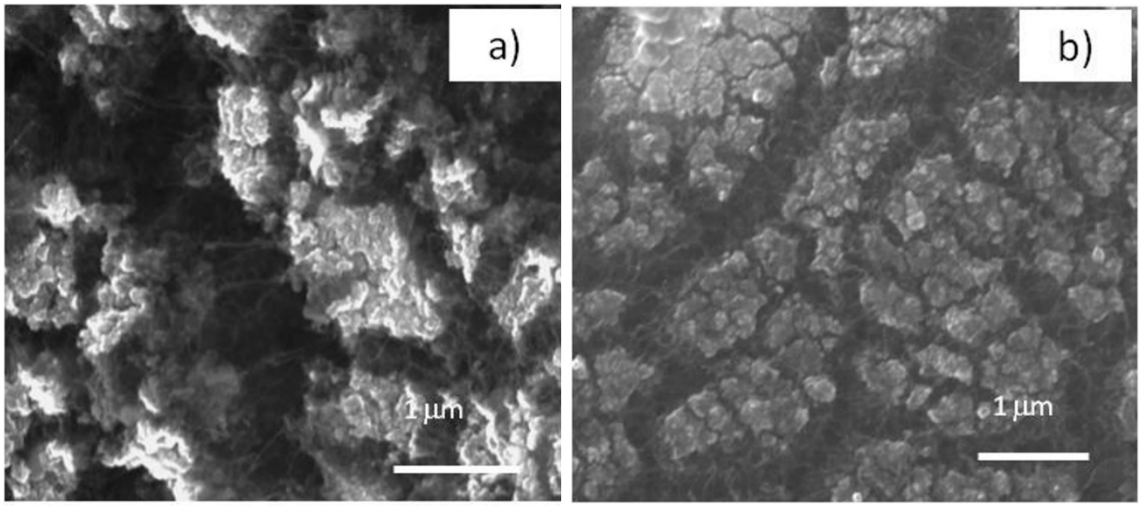


Fig. 3S SEM images of carbon nanostructures grown on Al-Mg substrate. Fe-based catalyst synthezed (a) in a $FeCl_3.6H_2O$ bath at room temperature (b) and $Fe(NO_3)_3.9H_2O$ bath at 50 ºC (c).

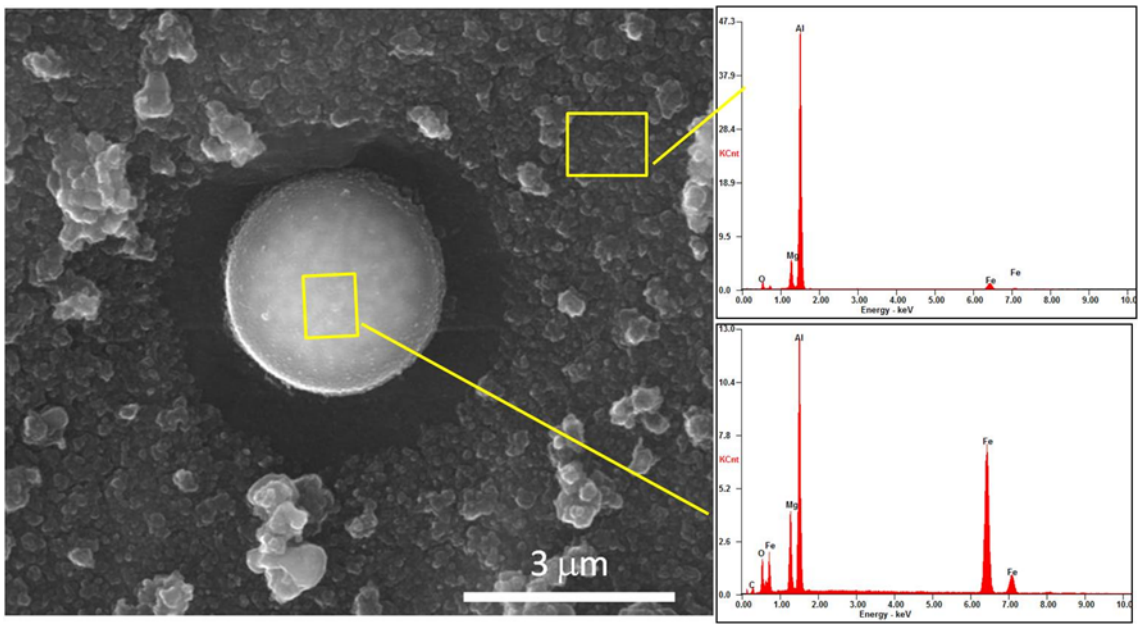


Fig. 4S SEM of a Fe-based catalyst without grown of C nanofilaments after CVD. EDS analysis on the substrate (upper) and on the particle (bottom).

**Table 1S** D and G band positions and its intensity ratio for the different carbonaceous materials.

| Bath-based SAMPLES | D ($A_{1g}$) ($cm^{-1}$) | G ($E_{2g2}$) ($cm^{-1}$) | $I_D/I_G$ |
|---|---|---|---|
| $Fe(NO_3)_3.9H_2O$, 50 ºC | 1346 | 1601 | 0.84 |
| $FeCl_3$, RT | 1342 | 1605 | 0.78 |
| $FeCl_2$, 50 ºC | 1341 | 1603 | 0.75 |
| Other ED samples | 1348 | 1588 | 0.97 |
| Carbon black | 1348 | 1588 | 0.87 |
| MWCNT | 1348 | 1588 | 0.68 |