Electronic Supplementary Material (ESI) for RSC Advances.

Additional Experimental conditions:

See text for Pd-deposition conditions. The sample was cooled down by removing the furnace along a rail system. The first annealing experiments were performed under an Ar/H_2 flow of 100 ml/min (gas pressure 1 bar) with the following temperature settings: 1000 ^oC for 1h and 650 ^oC for 6 hrs. Further annealing experiments were performed with a Rigaku Smartlab X-ray diffractometer (40 kv) at the temperatures of 25 ^oC, 150 ^oC, 300 ^oC, 400 ^oC (for 2 h) and 0 ^oC in vacuum (less than 7 Pa). The cooling process was achieved by using liquid nitrogen with a flow-rate of 2 L/h. SEM and backscattered electrons investigations were performed with a JSM-7500F at 10-20 kV. TEM and STEM were performed with an 200 kV American FEI Tecnai G2F20. XRD analyses were performed with an Empyrean Panalytical diffractometer (Cu K-α with λ = 0.154 nm). The magnetic measurements were performed at 3 Tesla in the range of 50-300 K.

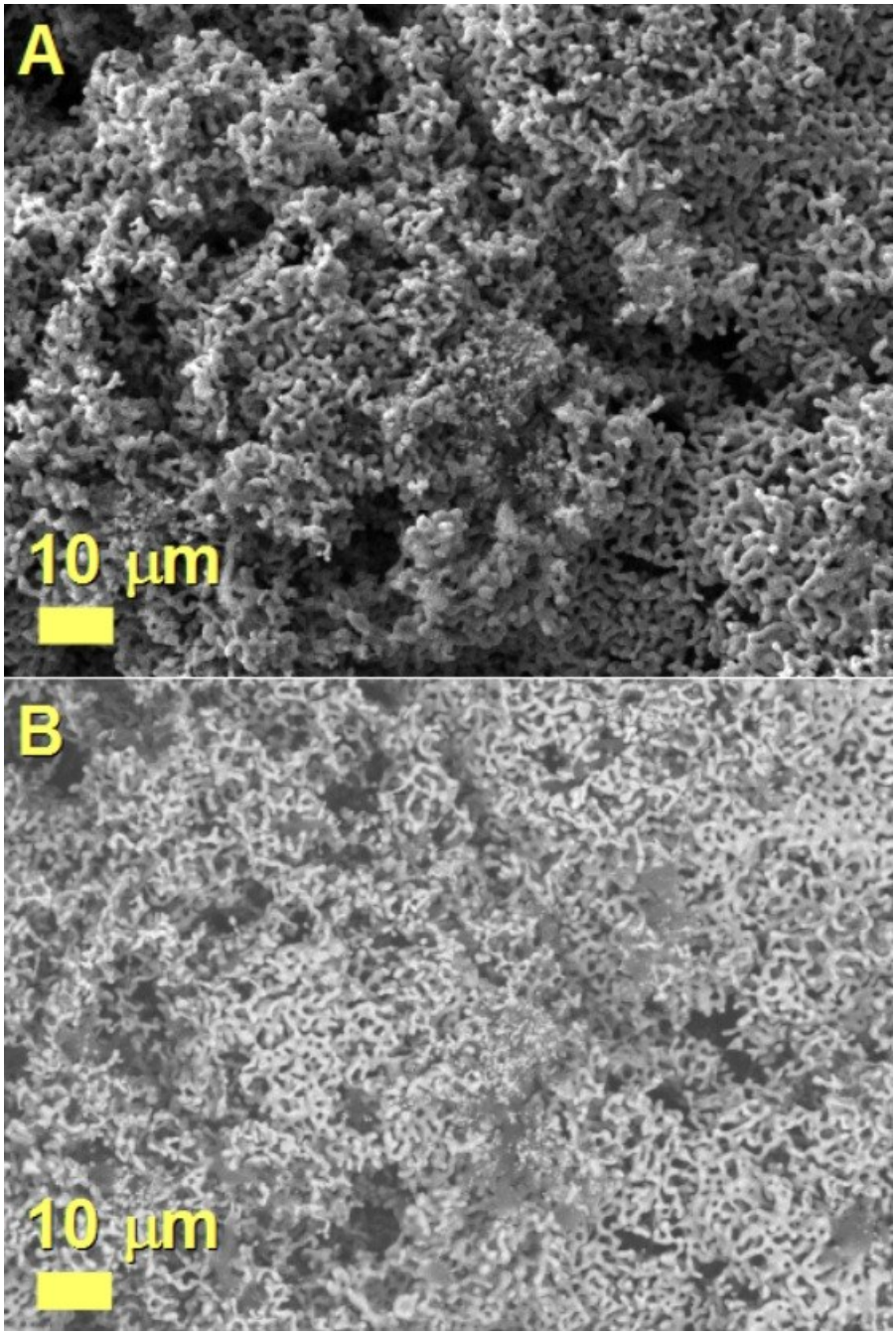

Figure1 Supp: SEM micrograph showing in (A) the morphological quality of the as produced foam-like film. The backscattered electron mode in B shows the high filling rate of the foam.

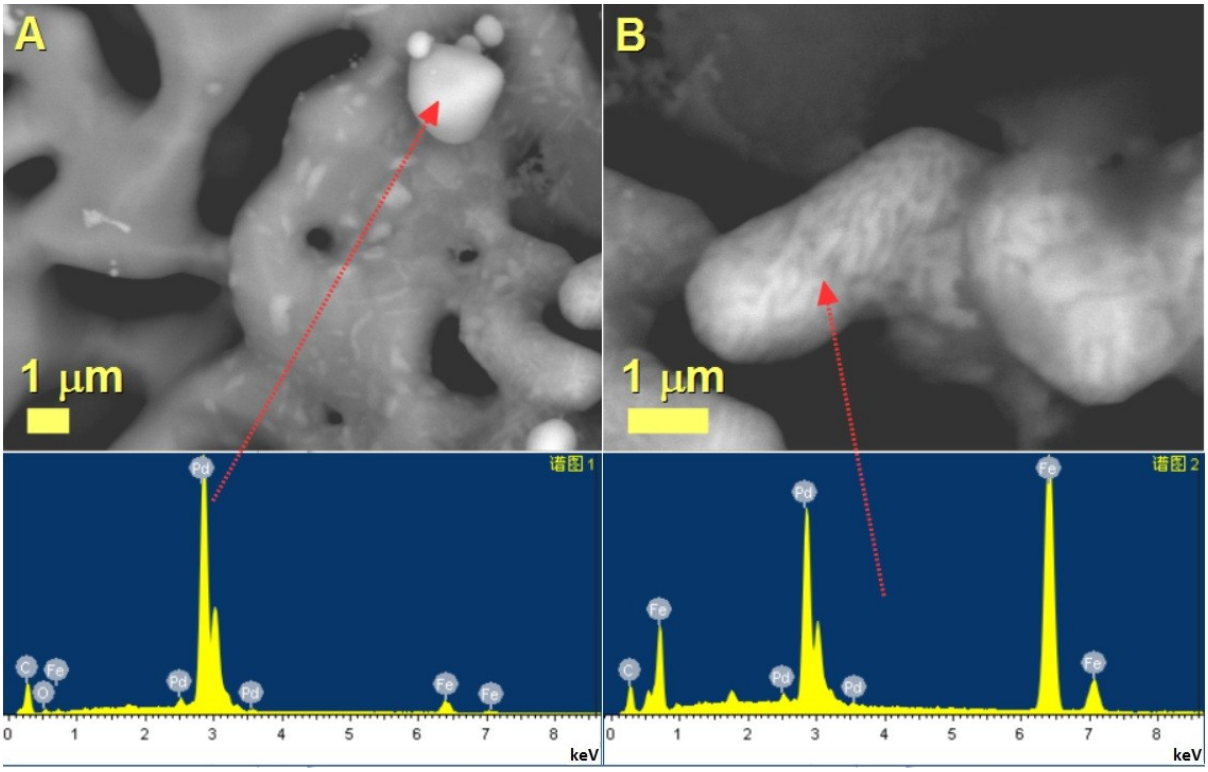

Figure2 Supp: SEM micrographs in backscattered electron mode showing in A and B two areas of FePd alloys nucleation after annealing with the respective EDX analyses (see text). In A the red arrow indicates the EDX analyses of a Pd particle chemisorbed into the Fe-filled foam. In B the arrows indicates an area of the foam containing the nucleated $FePd_3$ alloy.

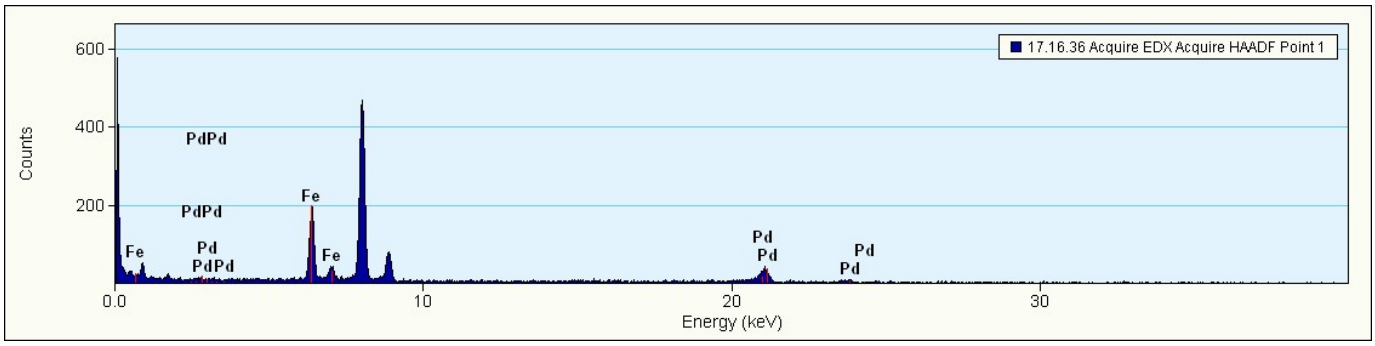

Figure3 Supp: STEM measurement of the area shown in Fig.4D proving the presence of Pd in the surface of the Fe-filling inside the foam-like carbon film.

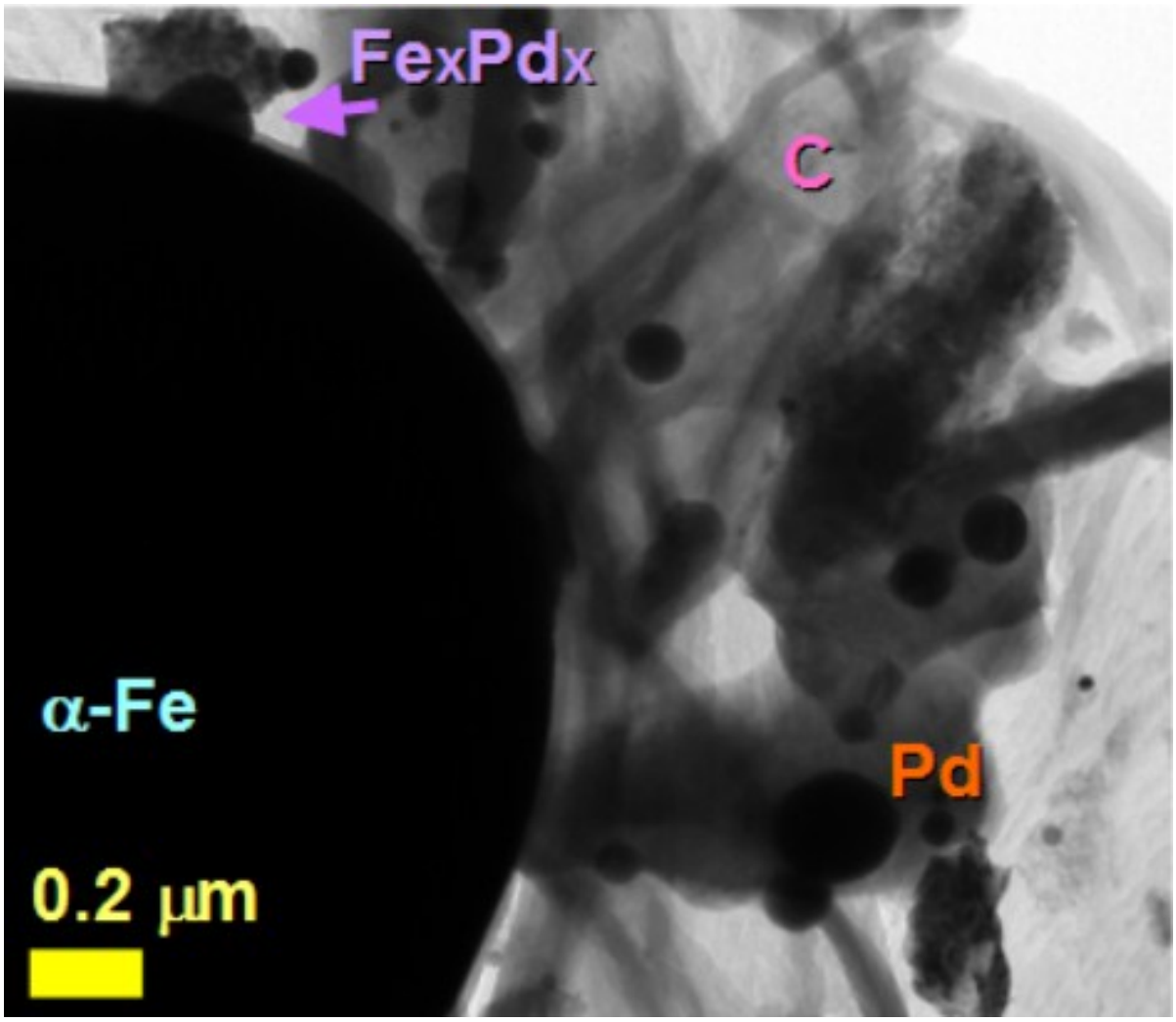

Figure4 Supp: TEM micrograph showing the morphology of the Pd particles encapsulated in amorphous carbon structures (right part of the image). These structures are deposited in the surface of the foam-like carbon film by CVD of dichloro-cyclooctadiene palladium. Due to the high mobility when in a melted status, at high temperatures the Pd catalyst is found to migrate in the inner regions of the foam (as shown by the magenta arrow).The indicated particle is found to be chemisorbed into the Fe-filling of the foam-like film (after annealing).

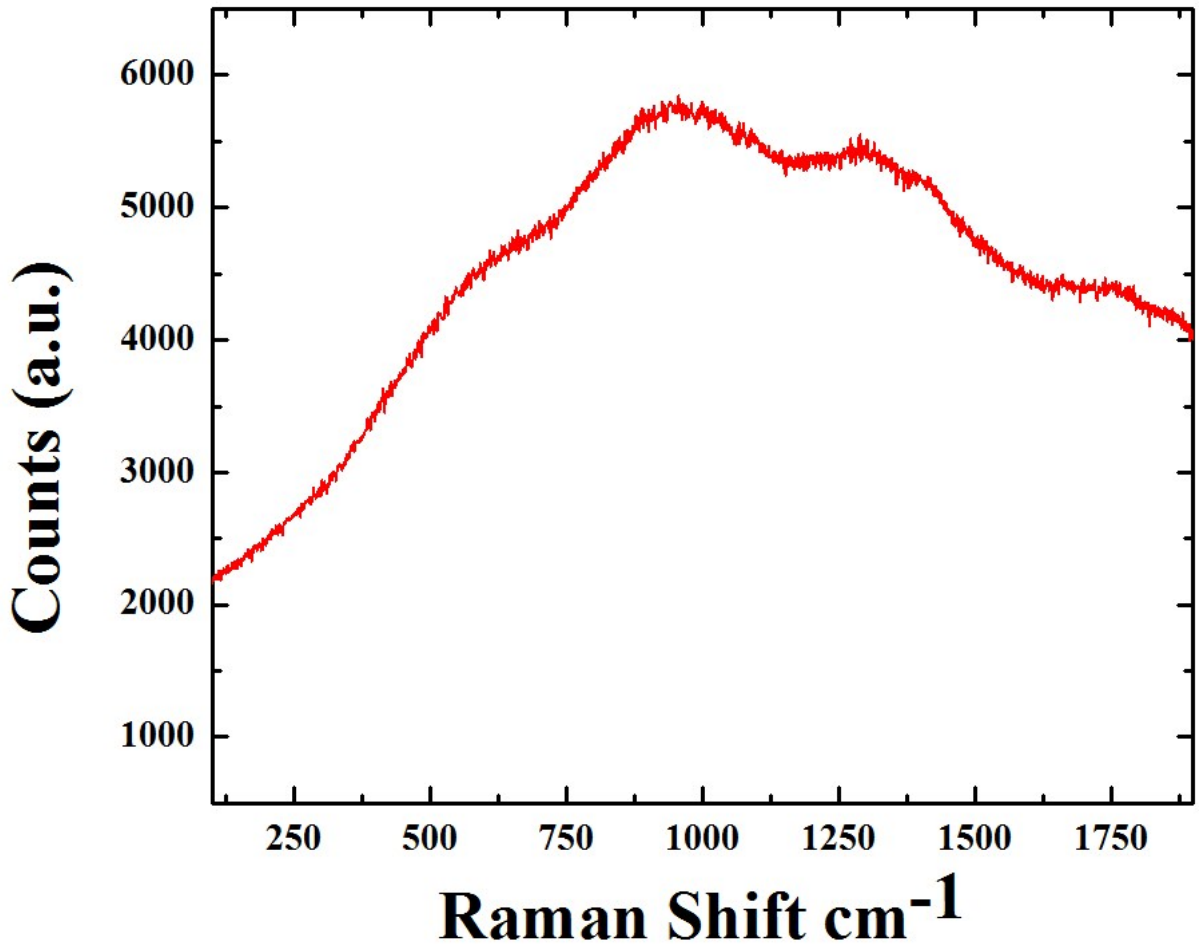

Figure 5 Supp: Raman Spectroscopy measurement of one of the areas of the foam film. In this case no peaks are observed suggesting that this region of the film has an amorphous arrangement.

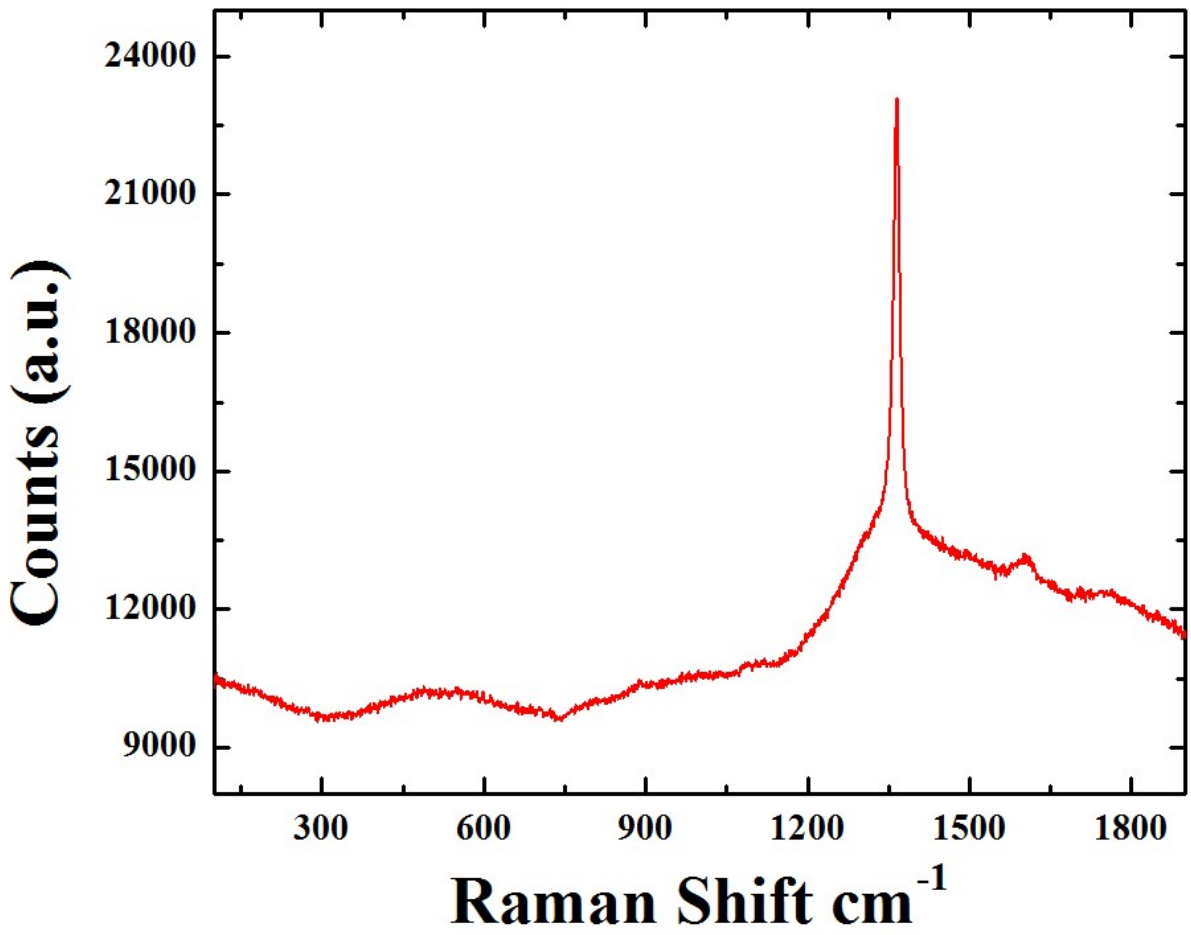

Figure 6 Supp: Raman Spectroscopy measurement of one of the areas of the foam film. In this case two peaks are observed. One peak with high intensity at 1364 .8 cm^{-1} which could be associated to the D band (disordered induced scattering produced by imperfections or loss of hexagonal symmetry in the carbon structure). Another very weak peak is observed at 1603.9 cm^{-1} which can be associated to the G band (Raman active $2E_{2g}$ mode which is generally observed in graphite like materials).

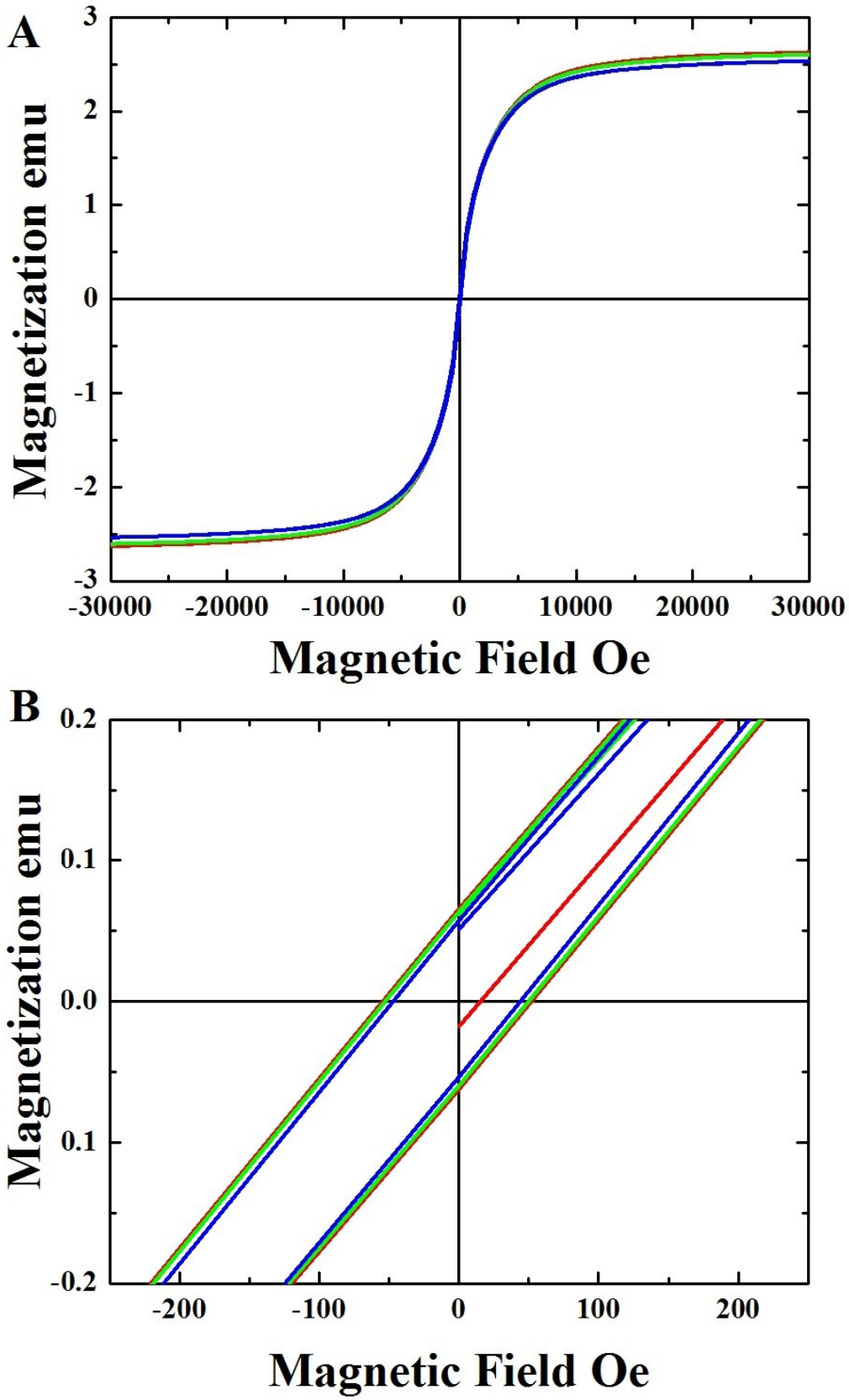

Figure 7 Supp: VSM measurements showing the variation of the saturation magnetization and coercivity with the temperature (red 50 K, green 150 K, blue 300 K). The weight of the measured films was 13.1 mg.