Electronic supplementary information

Thermal decomposition of layered double hydroxide as a bottom up approach for the synthesis of metallic nanoparticles embedded in carbon structures

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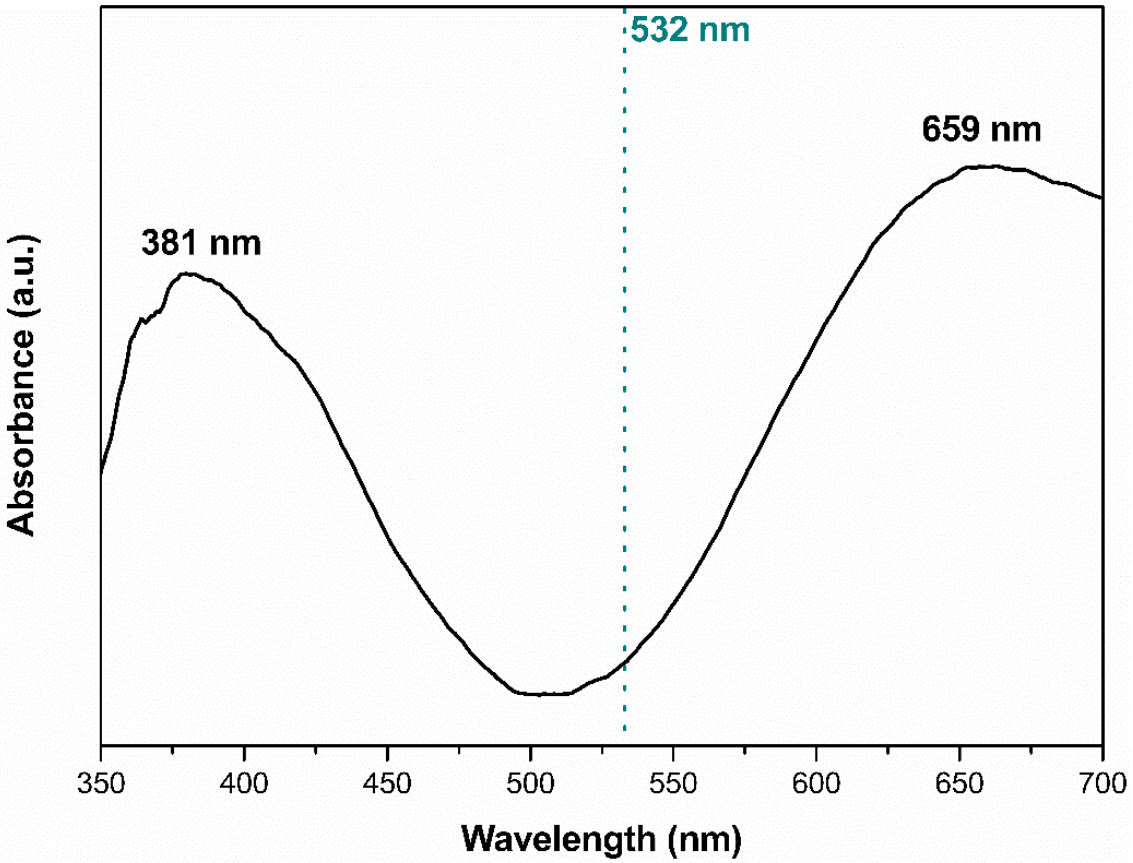

Fig. S1 Ultraviolet-visible electronic absorption spectrum of LDH-Cl (curve smoothed by Adjacent-Averaging method). The material was mixed with barium sulfate ($BaSO_4$) and the solid state spectrum recorded in spectrophotometer Shimadzu UV-2401PC eqquiped with a integrating sphere.

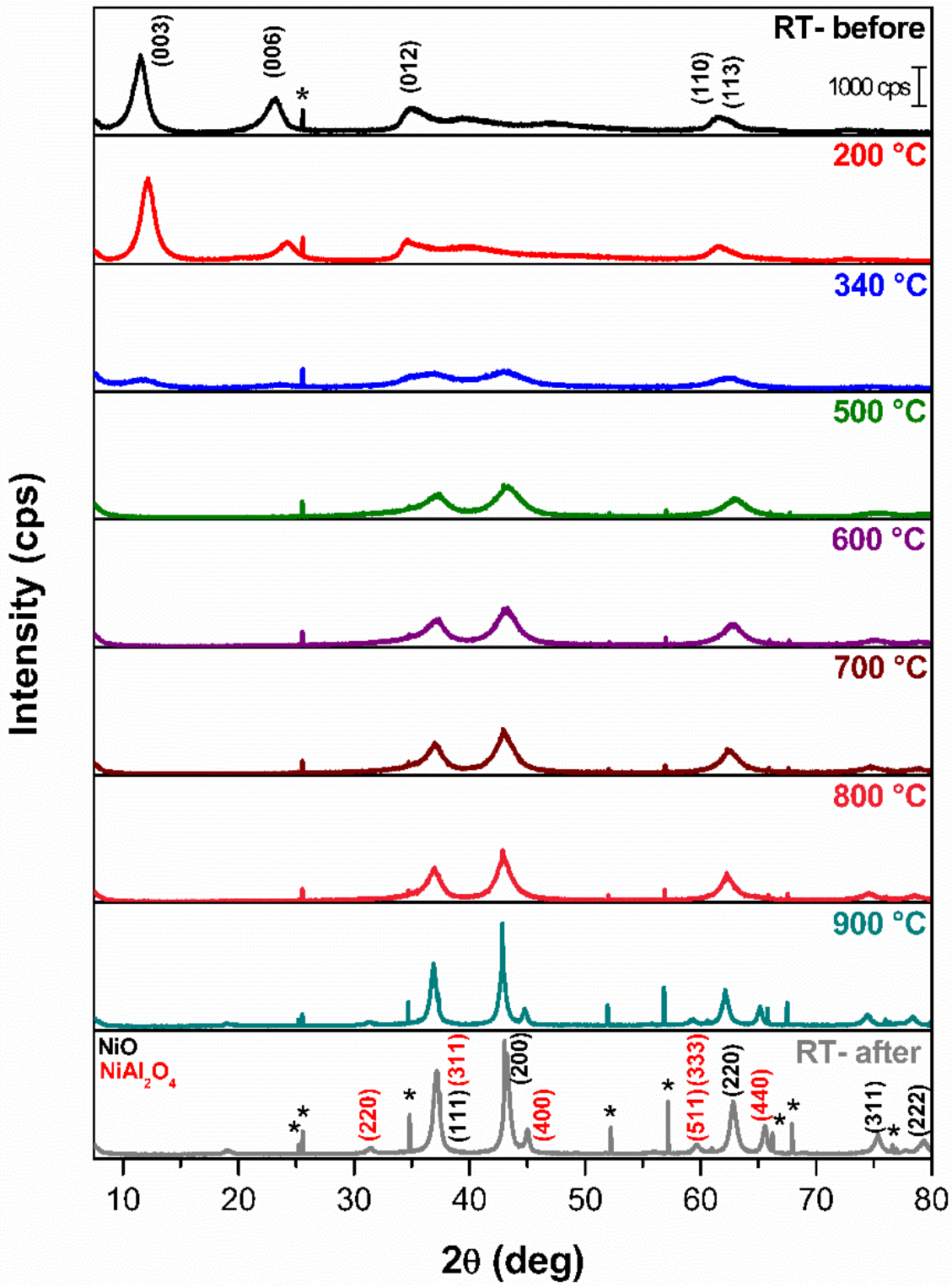

Fig. S2 HT-XRD patterns of LDH-Cl recorded under He atmosphere, under same conditions used for LDH-CMC sample. * sample holder.

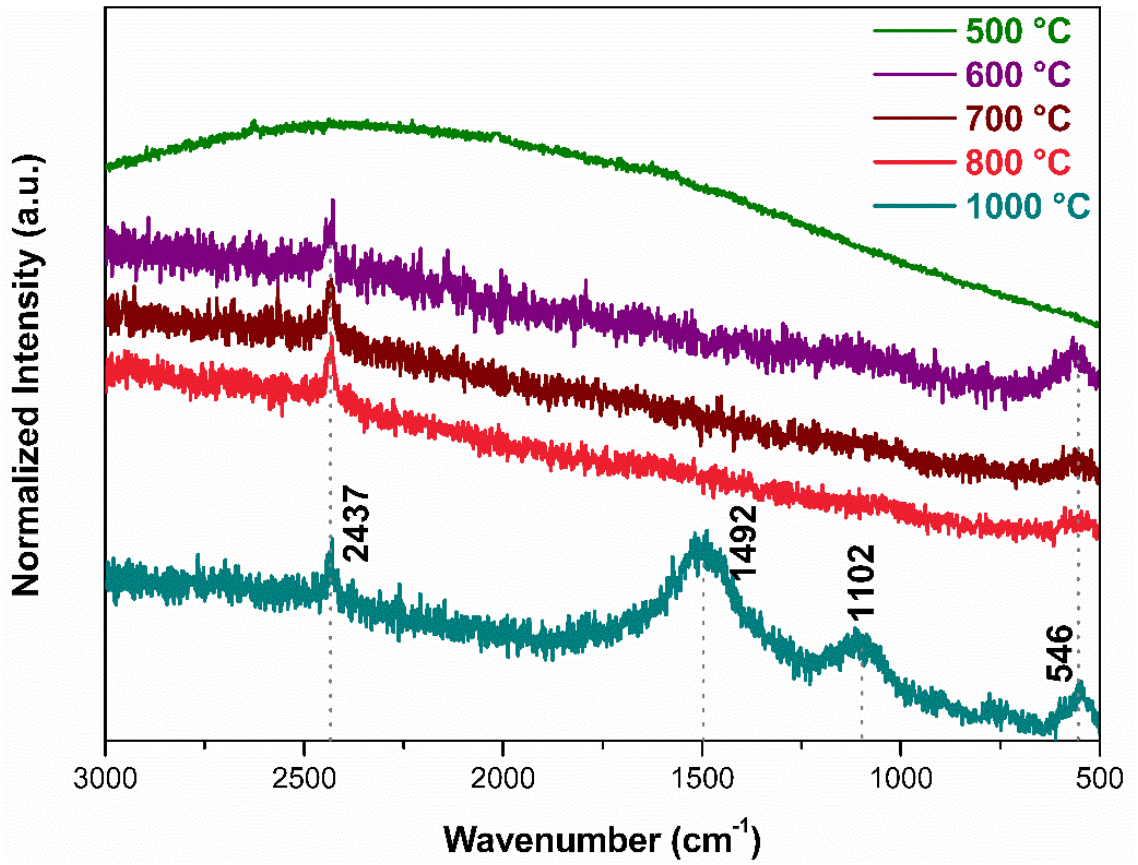

Fig. S3 Raman spectra of LDH-Cl-X series recorded using λ_{ex} of 532 nm.

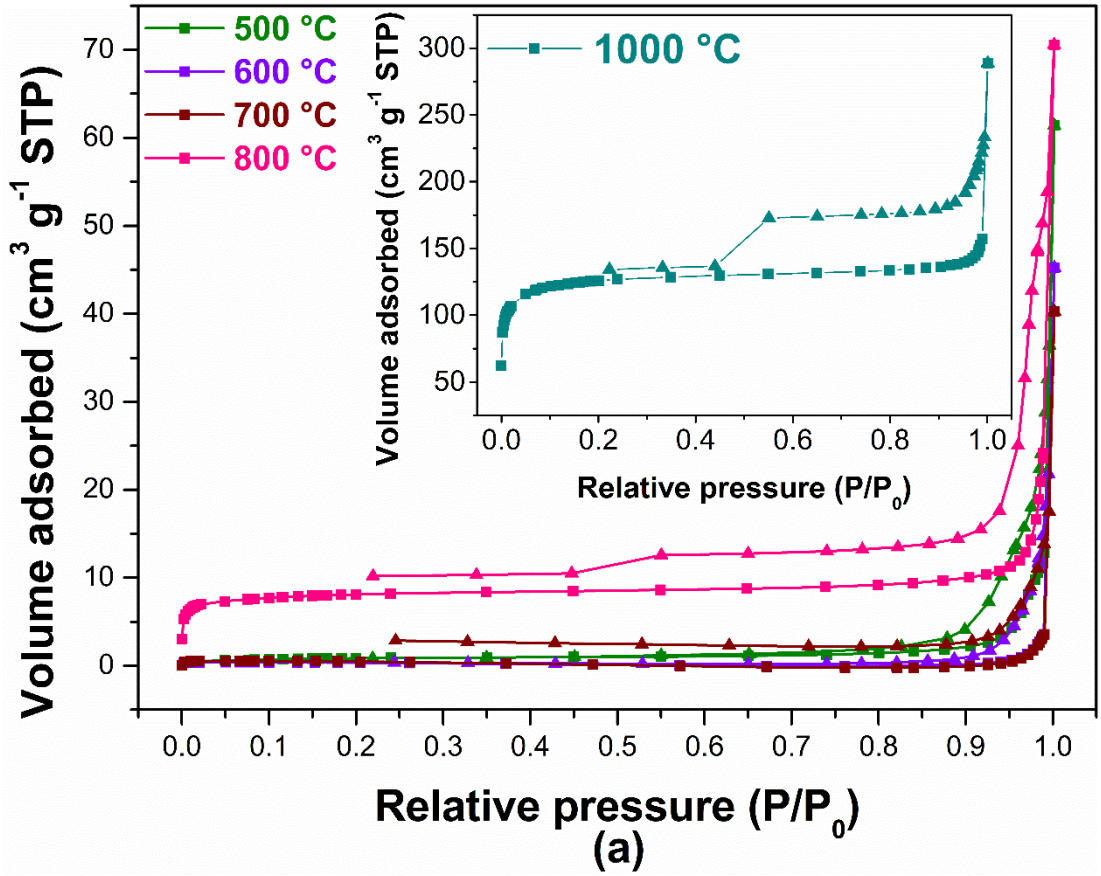

Fig. S4 N_2-adsorption/desorption isotherms of CMC-X (a) and LDH-CMC-X (b) samples series. *Inset* shows the curve of CMC-1000.

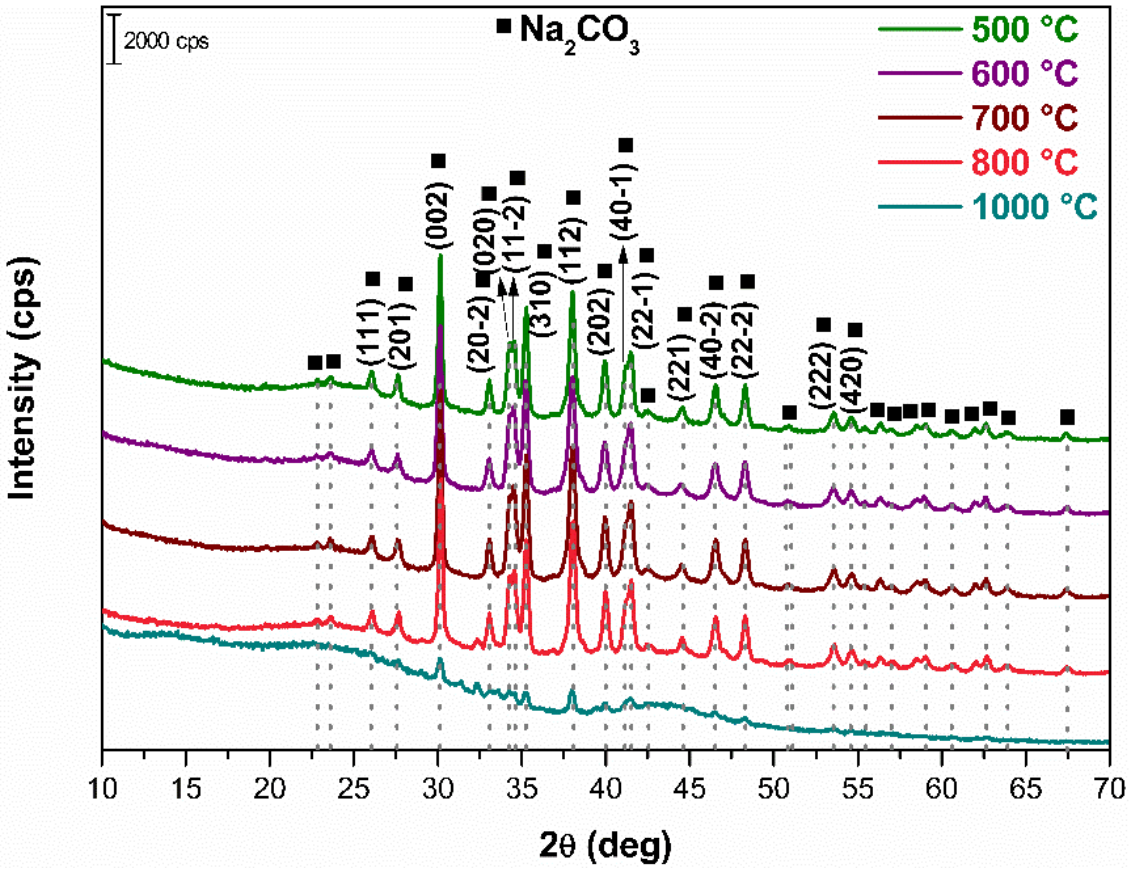

Fig. S5 XRD patterns of CMC-X materials pyrolyzed at the indicated temperature value.

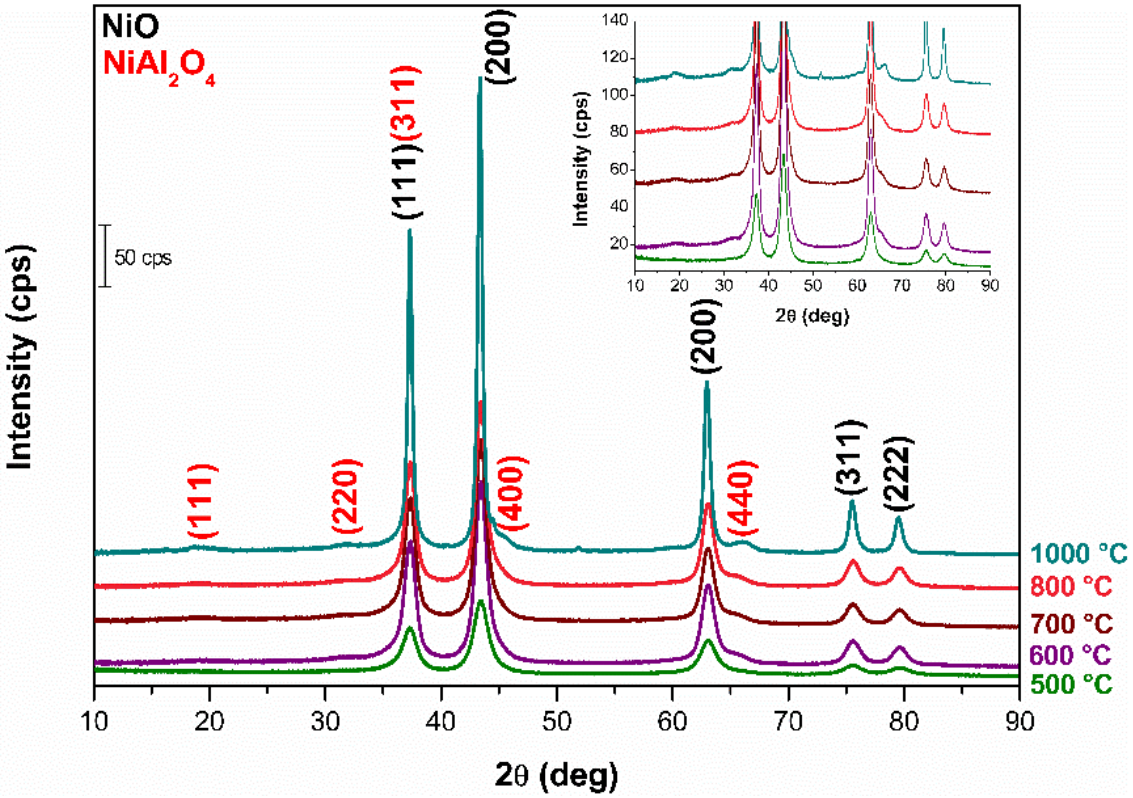

Fig. S6 XRD patterns of residues from LDH-CMC-X thermal analysis under air atmosphere. *Inset*: detailed diffractograms.

Table S1 LDH-CMC-X residual mass from TG curves recorded under air atmosphere and experimental mass percentages of nickel and carbon.

Pyrolysis temperature (°C)	Residual mass[a] (%)	%Ni[b]	%C[c]
600	81.4	21.5	13.7
700	83.9	24.1	14.3
800	85.8	25.5	13.6
1000	92.1	39.0	13.1

[a] Values obtained in the 200 - 900 °C range, in order to discount mass loss from dehydration process.

[b] Values estimated from magnetization saturation (M_S) of bulk nickel (55.1 emu g^{-1}),[1] and the corresponding values of each sample (see Fig. S6), calculated by: $\%Ni = \frac{M_S}{M_{S\,(bulk)}} . 100\%$

[c] Data from elemental chemical analysis.

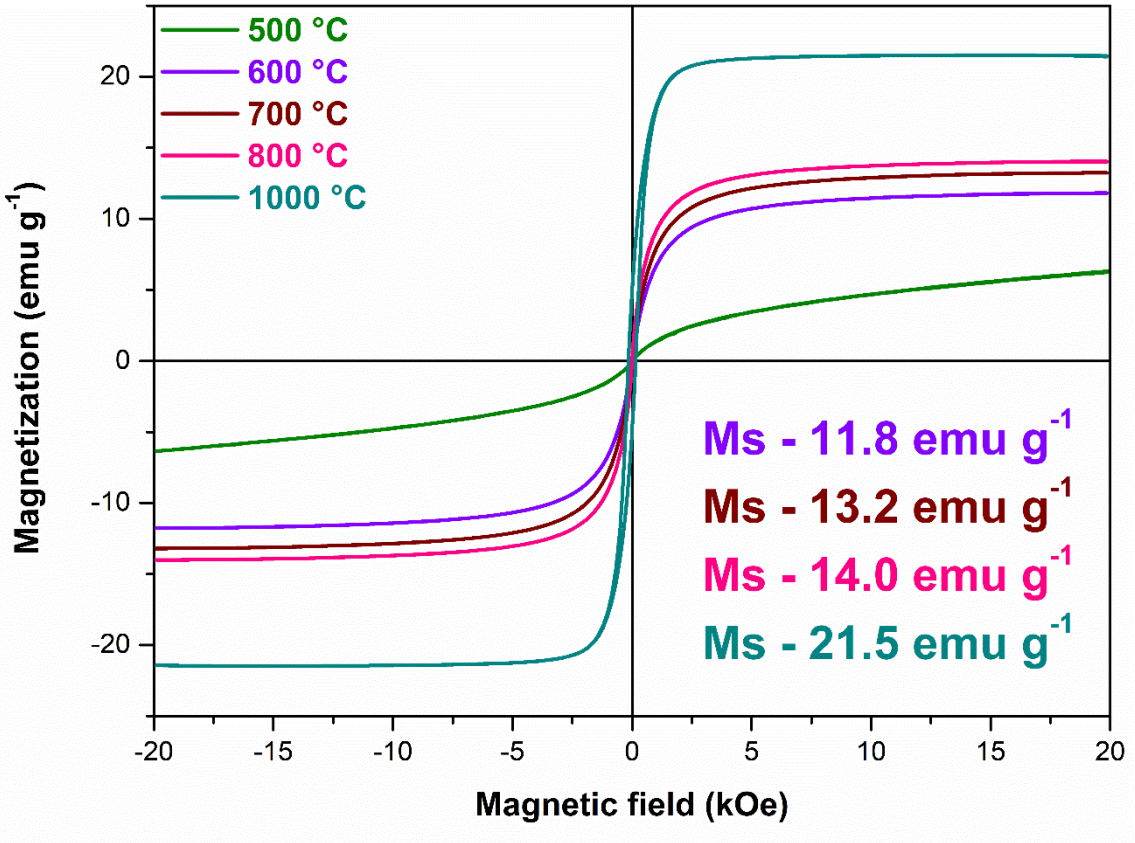

Fig. S7 LDH-CMC-X magnetization curves recorded at room temperature, containing the values of saturation magnetization (Ms) for the materials pyrolyzed from 600 to 1000 °C. The magnetization values were normalized by total mass of each material.

Reference

1 J. Crangle and G. M. Goodman, *Proc. R. Soc. A Math. Phys. Eng. Sci.*, 1971, **321**, 477–491.