Supplementary Materials: Mesoporous C/CrN and C/VN Nanocomposites Obtained by One-Pot Soft-Templating Process

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Thermogravimetric Analysis

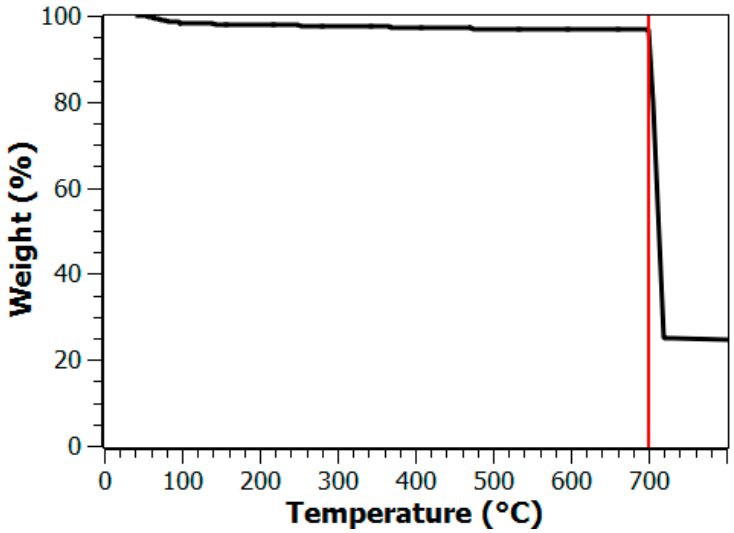

Figure S1. TGA curves of FDU-15/CrN-850°. Heating ramp is 10 °C/min in Ar flow. At 700 °C, Ar was switched to air and temperature was maintained at 700 °C for one hour.

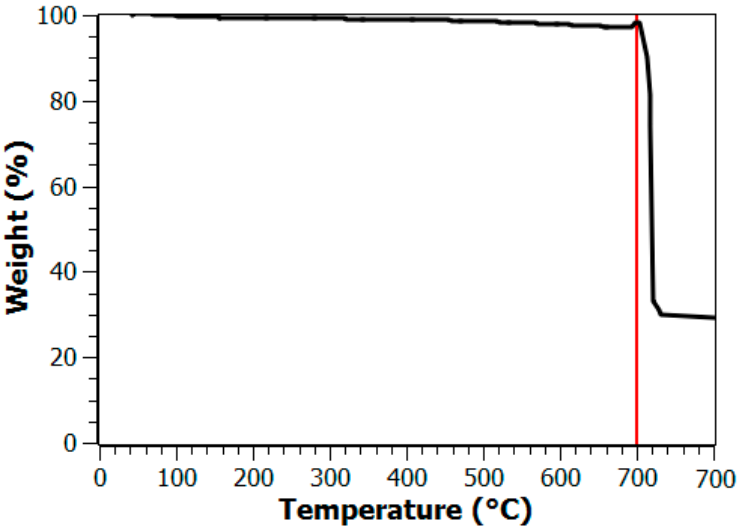

Figure S2. TGA curves of FDU-15/VN-950°. Heating ramp is 10 °C/min in Ar flow. At 700 °C, Ar was switched to air and temperature was maintained at 700 °C for one hour.

TGA curves (Figure S1 for FDU-15/CrN-850° and Figure S2 for FDU-15/VN-950°) were obtained by heating the samples up to 700 °C under argon flow and then by switching to air flow while maintaining the temperature constant. Weight variations observed correspond to carbon and TMN oxidations (only metal transition oxide remained after oxidation) according to the simplified reactions.

$$MN_x + yC + zO_2 \rightarrow MO_{x'} + aCO_{z'} + bNO_{z'} \text{ with } x' = 1.5,\ z' = 1 \text{ or } 2 \text{ and M = Cr or V}$$

XRD was used to determine the type of oxide phases which have been obtained (here Cr_2O_3 and V_2O_3). By subtracting the gain weight due to metal oxidation to the weight-loss observed after switching to air flow, MTN contents (wt %) were determined using the following formula,

$$\text{wt \% of } MN_x = (\text{wt \% variation during oxidation} + 100) \times (MM\ (MN_x)/MM(MO_{x'}))$$

derived from the basic formula given below where MM is the molar mass.

$$\text{wt \% variation during oxidation} = 100 \times (\text{mass } (MO_{x'}) - (\text{mass } (MN_x)_{initial} + \text{mass}(C)_{initial}))/(\text{mass } (MN_x)_{initial} + \text{mass}(C)_{initial}).$$

Thus, initial weight contents of MTN in C/MTN nanocomposites were calculated by difference and were equal to 21 wt % of chromium nitride and 28 wt % of vanadium nitride.

Calculation of the individual carbon phase contributions to Quantitative results of N_2 physisorption measurements (Table 1).

This calculation is explained by considering the case of FDU-15/CrN 850° sample which displays a surface area of 777 m^2/g. It has been shown previously that CrN contributes to 21 wt % of the sample. Then, by neglecting CrN contribution to the surface area (owing to its high density and non porous character), the surface area arises mainly from the carbon part (the 79 wt % remaining). Thus, for 1 g of sample, 777 m^2/g of surface are mainly due to 0.79 g of carbon so the specific surface area per g of carbon is 777/0.79 which is equal to 983 m^2/g.

Particle Size Distributions by TEM

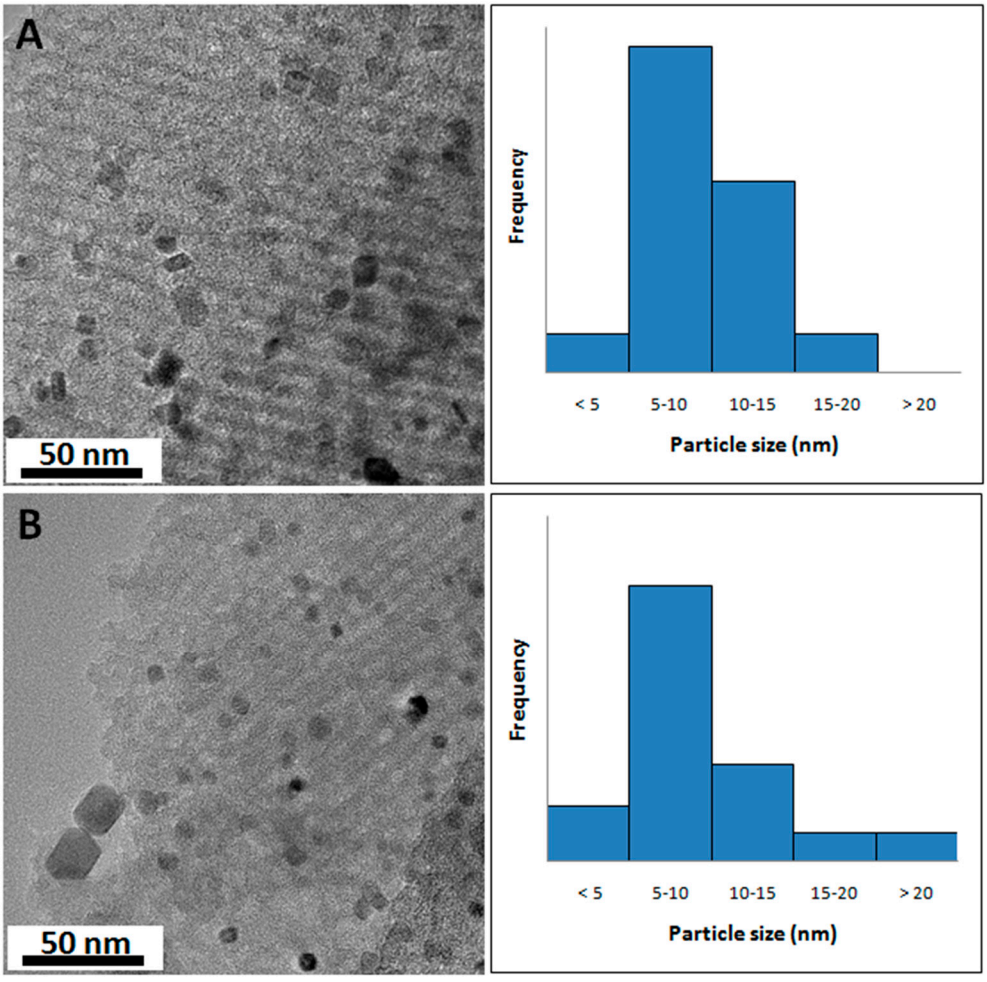

Figure S3. TEM picture at high magnification and TMN particle size distribution of FDU-15/CrN-850° (**A**) and FDU-15/VN-950° (**B**).