Synthesis of Ternary Metal Nitride Nanoparticles Using Mesoporous Carbon Nitride as Reactive Template

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Supporting Information:

Figure S1: X-Ray diffraction pattern of mesoporous graphitic C_3N_4 (mpg-C_3N_4)

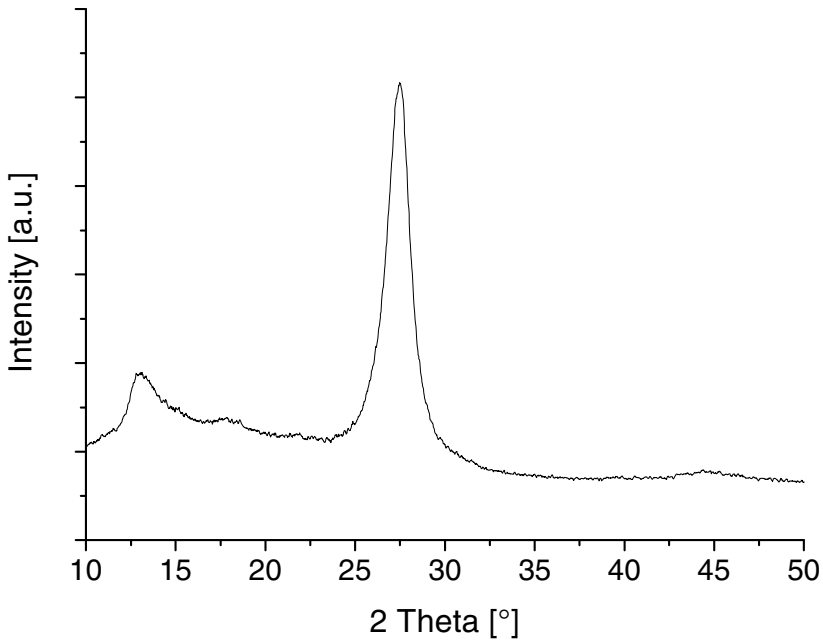


Figure S2: Transmission electron micrograph of mpg-C_3N_4.

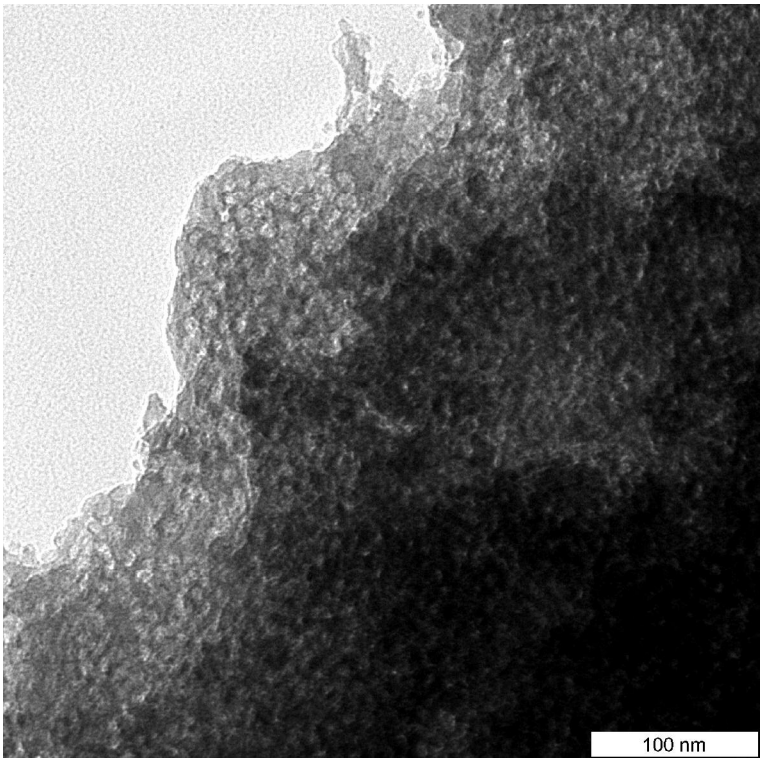


Figure S3: SAXS diffraction pattern of mpg-C_3N_4.
The curve shows a spherical form factor, which has a minimum at 11.6 nm (fit of the form factor minimum position using a hard sphere model without interactions). This was further confirmed by calculating the pore size and surface area from the Porod length. The pore size was found to be 11.4 nm and the surface area 243 m^2/g.

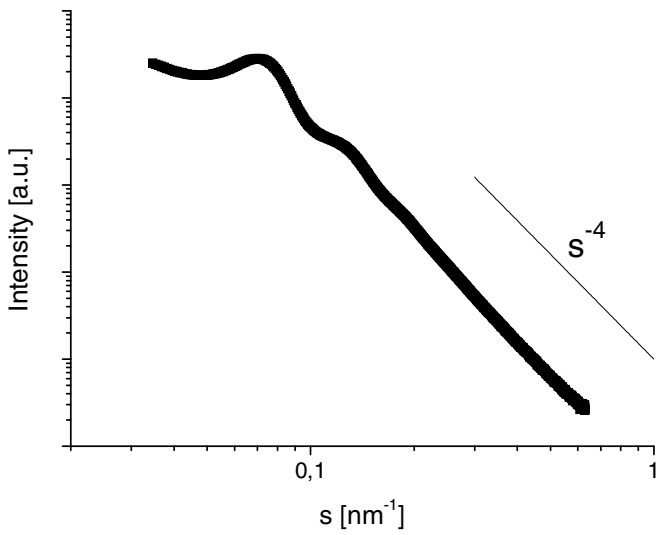


Figure S4: Nitrogen sorption of mpg-C_3N_4.

The surface area of the sample was determined using the Brunauer, Emett and Teller (BET) model. The pores size distribution was determined with the BJH model using the adsorption branch. The average pore size is about 11.5 nm.

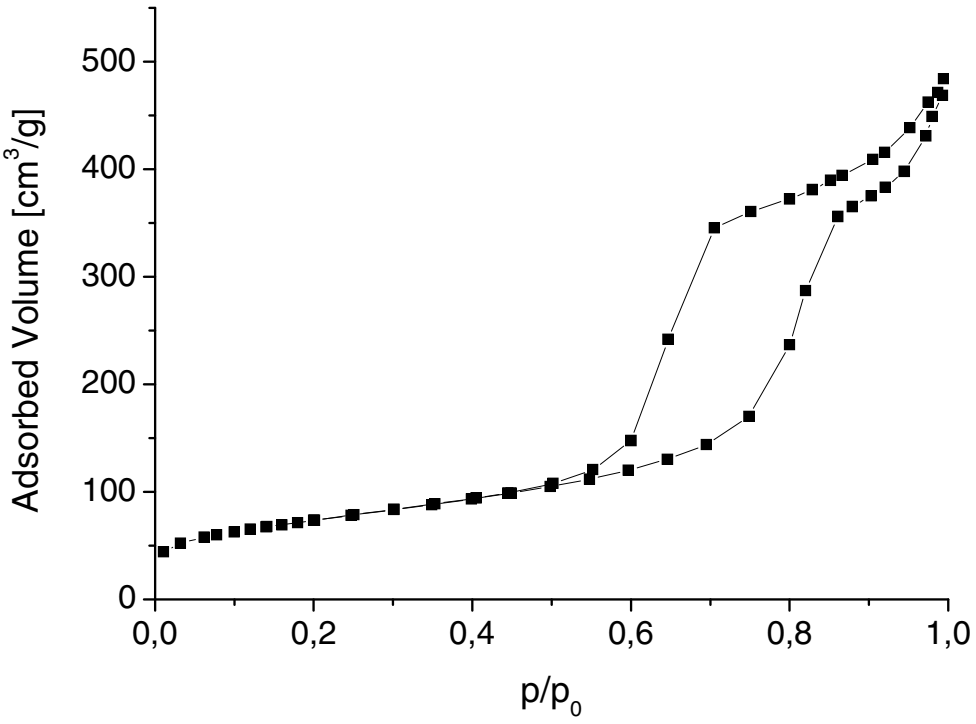


Table S1: Diffraction peak positions of the observed Al-Ga-N, GaN and AlN powders synthesized in the same reaction conditions.

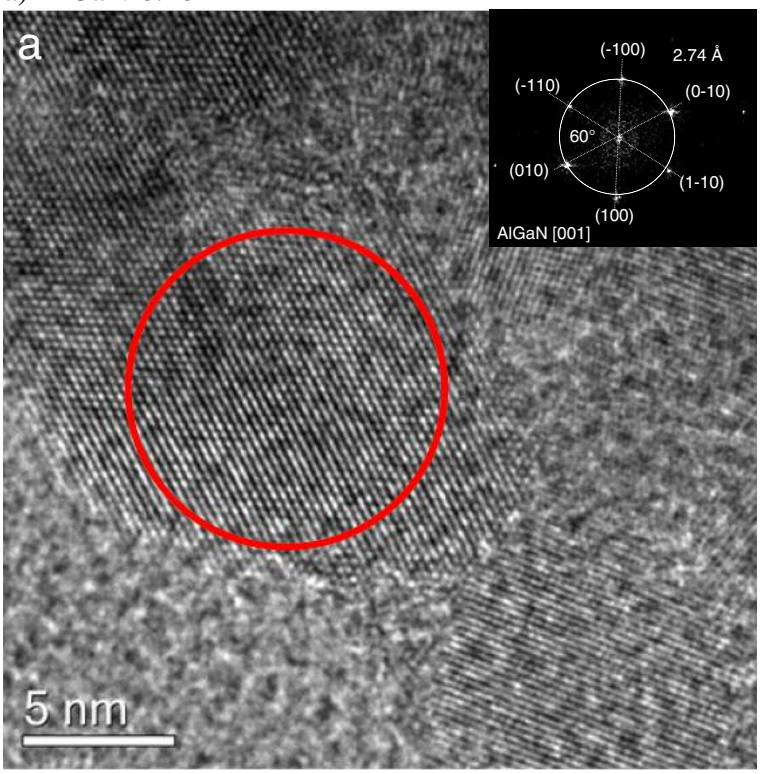
Sample	Peak position 2θ [°]					
	(100)	(002)	(101)	(102)	(110)	(103)
GaN	32.42 2.76	34.60	36.88	48.14	57.83	63.51
AlGaN-0.20	32.51 2.75	34.77	37.00	48.35	58.02	63.80
AlGaN - 0.35	32.58 2.74	34.92	37.10	48.50	58.14	64.06
AlGaN - 0.59	32.71 2.73	35.12	37.23	48.75	58.31	64.45
AlN	33.22 2.70	36.08	37.94	49.85	59.36	66.10

Table S2: Diffraction peak positions of the observed Ti-V-N, TiN and VN powders synthesized in the same reaction conditions.

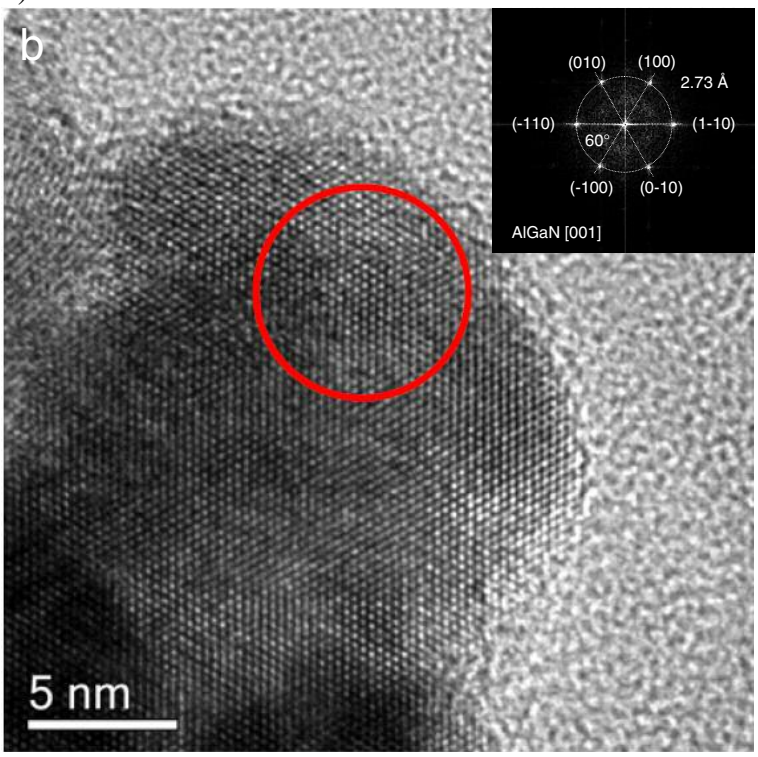
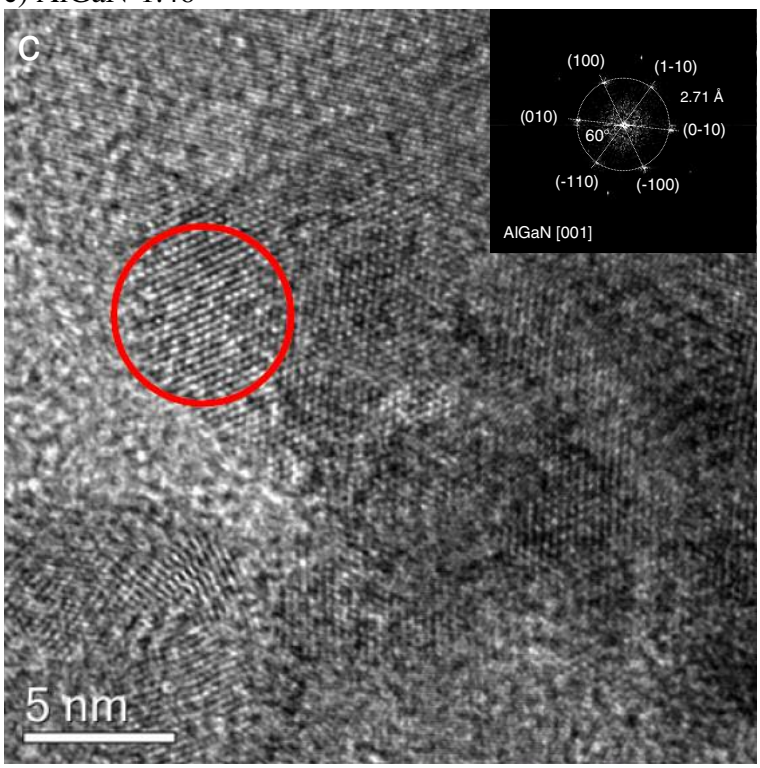
Sample	Peak position 2θ [°]				
	(111)	(200)	(220)	(311)	(222)
TiN	36.77 2.444	42.72	62.01	74.32	78.23
TiVN-0.19	36.89 2.436	42.86	62.22	74.58	78.52
TiVN-0.55	37.03 2.428	43.02	62.47	74.89	78.85
TiVN-1.46	37.44 2.402	43.50	63.22	75.85	79.87
VN	37.73 2.384	43.84	63.73	76.50	80.57

Figure S5: HRTEM (High resolution TEM) micrographs and corresponding Fourier Transform of Al-Ga-N nanoparticle with increasing Al content.

a) AlGaN-0.20



b) AlGaN-0.72



c) AlGaN-1.46