Supporting Information

Ag/white graphene foam for catalytic oxidation of methanol with high efficiency and stability

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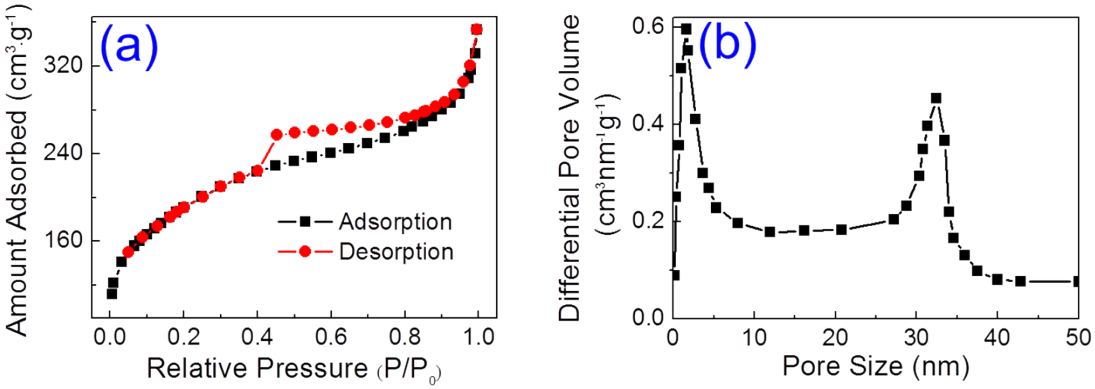

Fig. S1: Nitrogen adsorption–desorption isotherm and the corresponding pore size distributions of white graphene foam.

Gas adsorption measurements are widely used for determining the surface area, pore volumes and pore size distribution of the materials. Fig. S1 illustrates a nitrogen adsorption–desorption isotherms and the corresponding pore-size distribution (PSD) of the 3D BN product. The measured isotherm (S1(a)) can be classified as a type-IV isotherm according to the international union of pure and applied chemistry (IUPAC) nomenclature, and exhibits an H2 type broad hysteresis loop. From the isotherm, we can find that the type H2 hysteresis loop at a relative pressure between 0.4 and 1.0, the isotherm displays is relatively steep on account of the capillary condensation, which indicates the presence of mesopores in the product. If the adsorbent have relatively wide pore size distribution that is to say the size of holes is relatively dispersive, the adsorption amount along with the relative pressure variation is comparatively slow, generally speaking, the curve will appears relatively flat region, which is consistent with the PSD date with

wide pore size distribution.[1] Calculation with the Brunauer-Emmett-Teller (BET) model gives a large specific surface area of 681 m^2 g^{-1} and a pore volume of 0.58 cm^3 g^{-1}. Non-local density functional theory (NLDFT) calculations give a multiaperture broad pore size distribution ranging from 0 to 50 nm, which gives a bimodal distribution with the main characteristic pore sizes of 1.5 and 32 nm.

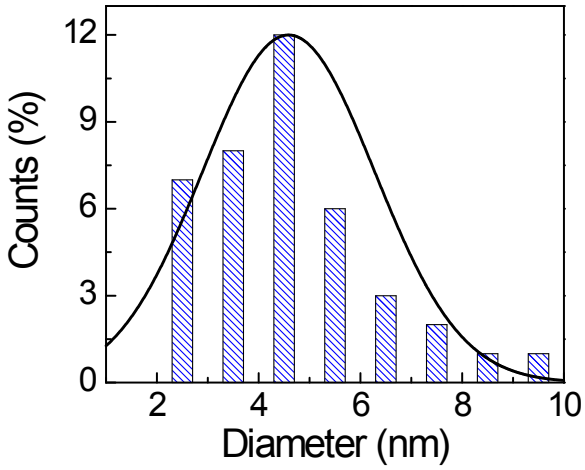

Fig. S2: The size distribution of silver nanoparticles. The average diameter is about 5 nm with size distribution from 2 to 10 nm.

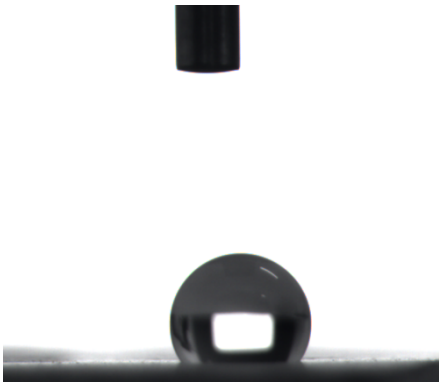

Fig. S3: Hydrophobic properties of white graphene foam and the static contact angle can reach to 131°.

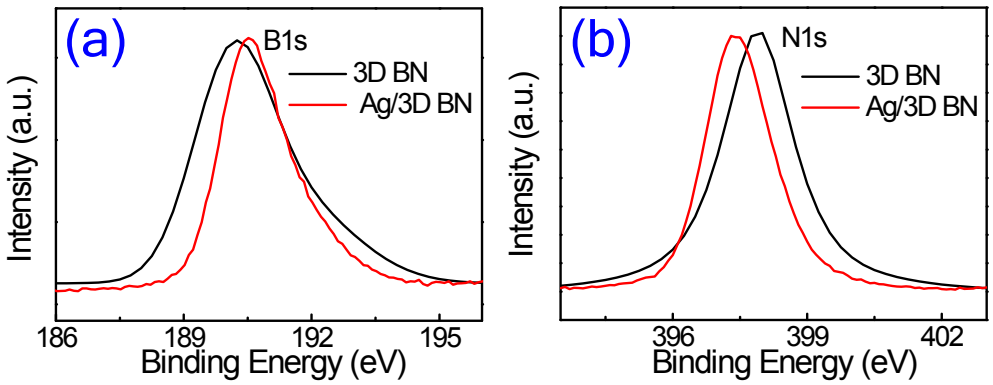

Fig. S4: The detailed B1s, N1s spectra of 3D BN and Ag/3D BN sample

The slight movement of B1s, N1s peak position and shape, indicating that presence interaction

between boron nitride and silver, not simple mixed together.

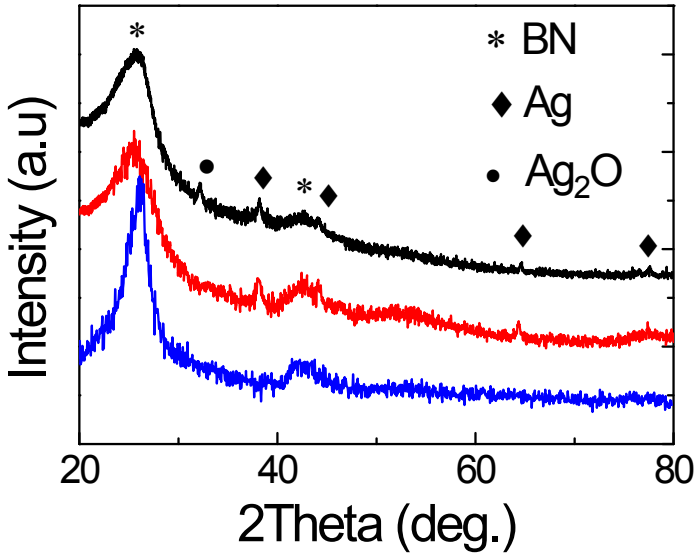

Fig. S5: X-Ray diffraction (XRD) patterns of the 3D BN and Ag/3D BN before and after O_2 treatment.

In the 3D BN spectra, two large diffraction peaks are observed around 26° (2θ) and 42° (2θ), which can be attributed to the (002) planes and the (100) planes, revealing a typical hexagonal structure of BN.[2, 3] In Ag/3D BN spectra before O_2 treatment, another four diffraction peaks at 38.12, 44.3, 64.46 and 77.42° is corresponding to the (111), (200), (220), (311) planes of silver, respectively. The Ag/3D BN spectra emerge a characteristic peaks of Ag_2O (111) after oxygen treatment, indicating that silver catalyst system produce a small amount of silver oxide species after high temperature O_2 treatment.[4-6]

Notes and references

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