Electronic Supplementary Information (ESI)

Facile Synthesis of B/g-C_3N_4 Composite Materials for the Continuous-Flow Selective Photo-production of Acetone

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In this work versatile boron–carbon nitride composite materials were syntheesized and utilized in a sustainable process using sunlight as the energy source for the continuous-flow selective photocatalytic production of acetone from 2-propanol. It is worth to highlight that the samples preparation were carried out by environmentally friendly strategy, in absence of solvent or additional reagents. Samples contained boron in a 1 to 10 wt. % were subjected to physico-chemical characterization using XRD, porosimetry, UV-visible, TEM, energy-dispersion x-ray spectroscopy and XPS. Analysis of the reaction output was carried out on the basis of the reaction rate, selectivity and quantum efficiency of the process. A correlation analysis between catalytic properties with two observables, the boron phase distribution in the materials and charge handling efficiency (measured using photoluminescence), rationalizes photoactivity. Such analysis indicates that the presence of an amorphous boron metallic phase and its contact with the carbon nitride component are key to set-up a renewable and easy scalable chemical process to obtain acetone.

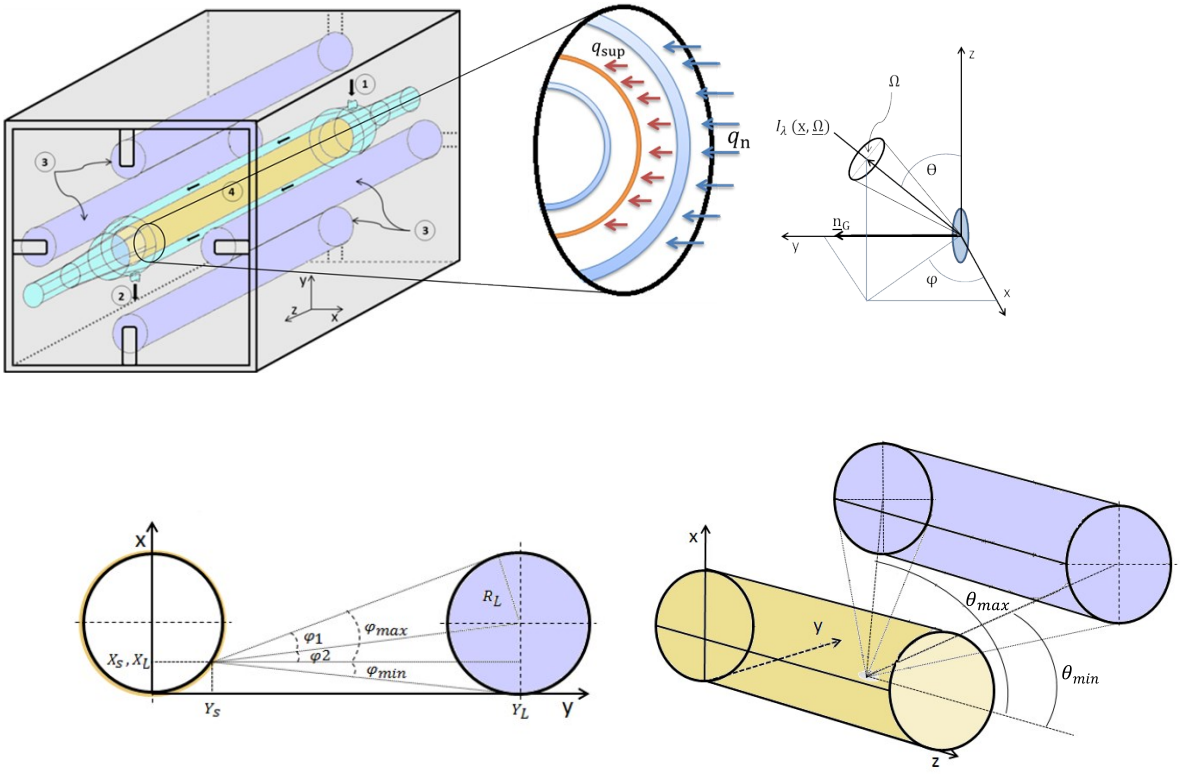

Figure S1. Upper, Left: Photocatalytic annular reactor scheme. (1) gas inlet, (2) gas outlet, (3) lamps, (4) catalyst (brown) sample. q_{sup} radiation flow on the surface of the sample (red), q_n radiation flow from the lamps (blue). Upper, Right: Center of coordinates located at the sample (defined by coordinates x_s, y_s, z_s). Down, Coordinate system to define the integration limits of radiation Model. (Left) φ_{min} and φ_{max}. (Right) θ_{min} and θ_{max}.

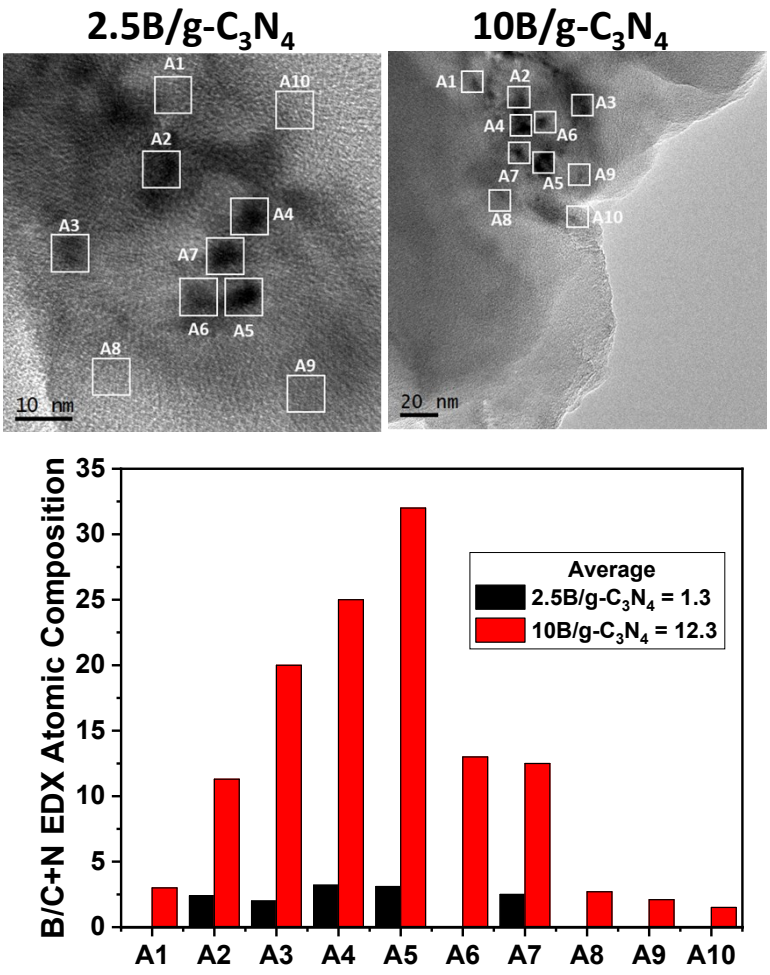

Figure S2. TEM-EDX analysis of 2.5B/g-C_3N_4 and 10B/g-C_3N_4 samples.

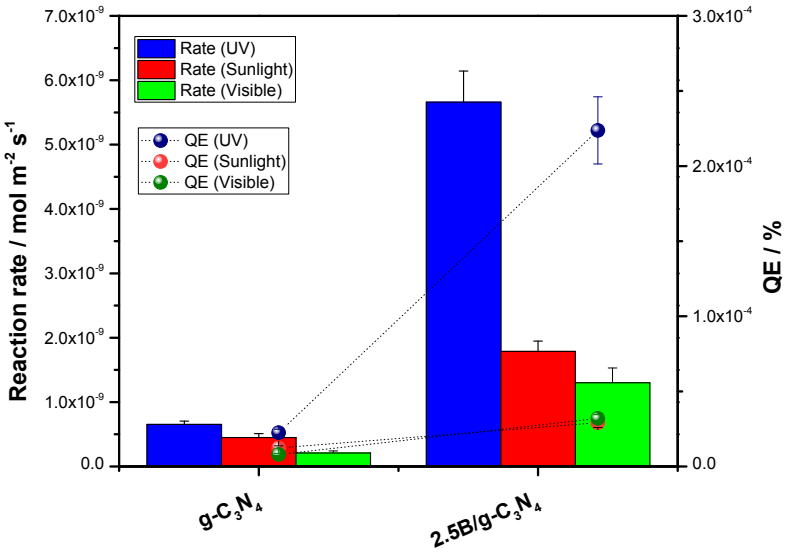

Figure S3. Reaction rate and quantum efficiency under UV, Visible and Sunlight-type of sample 2.5B/g-C_3N_4 and g-C_3N_4 reference.