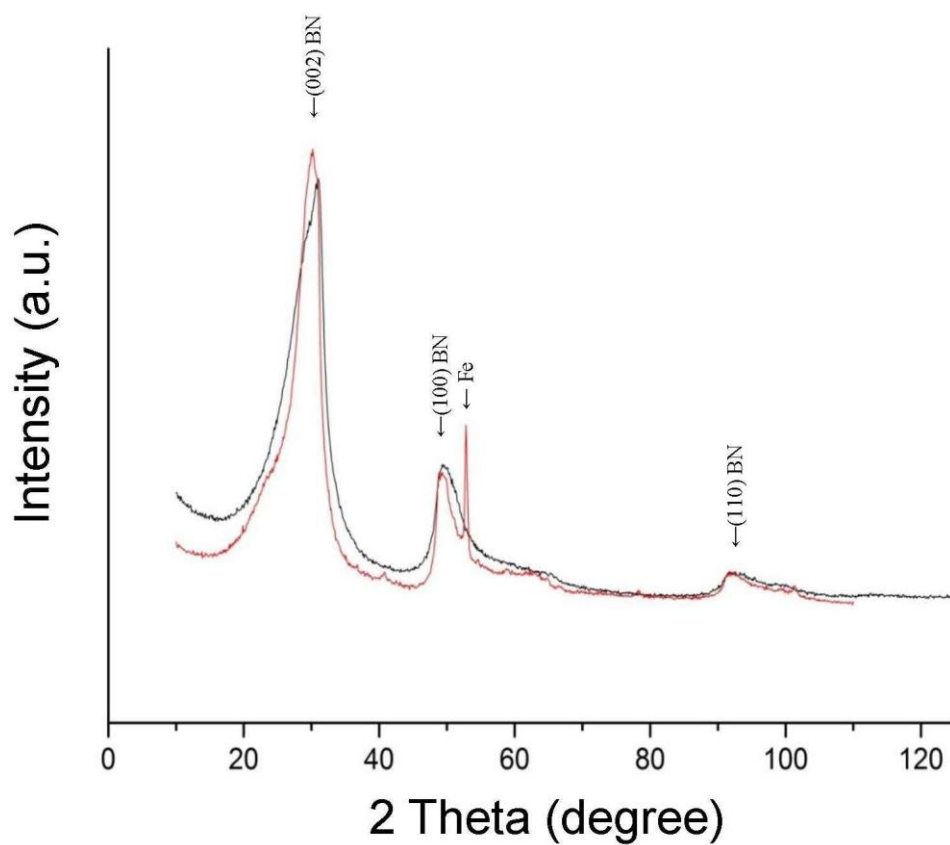
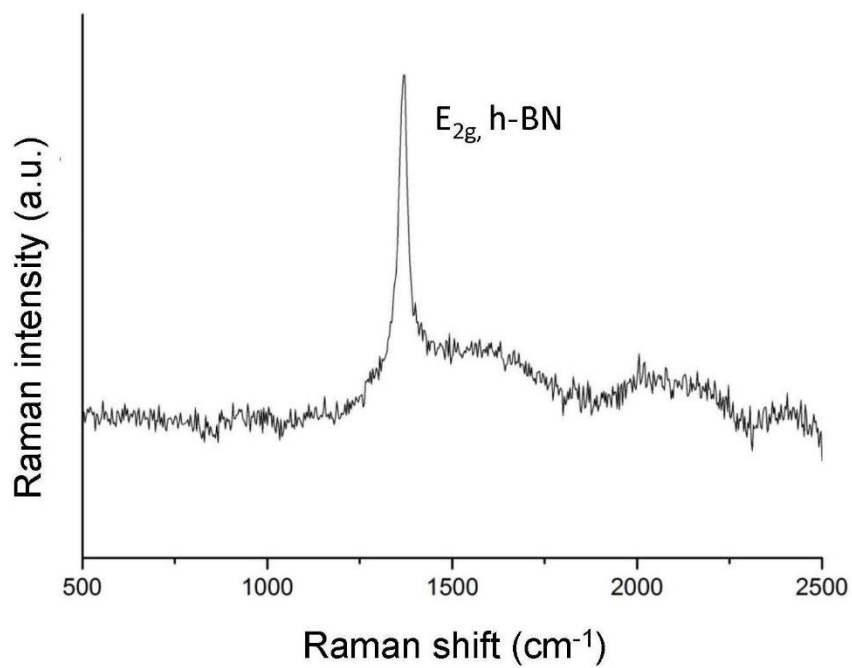


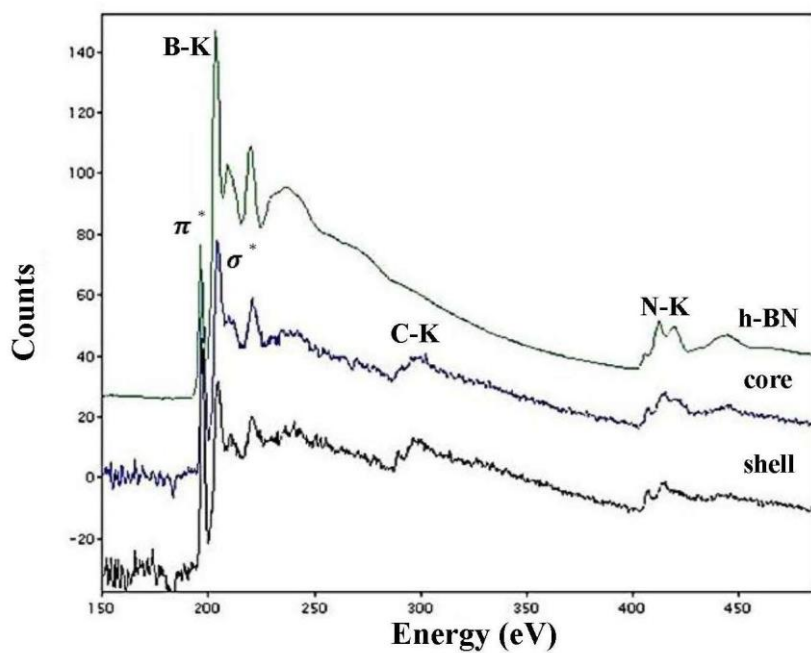
**Figure S1.** The products of BNO nanoparticles syntheses. a) A white color powder-like film covering the collecting crucible; b) a view of the product on a precursor surface after the synthesis at a gas flow rate of  $\text{Ar}/\text{NH}_3 < 4$ . Indicative traces of outgassing on the precursor surface are apparent.



**Figure S2.** Typical X-ray patterns of the materials obtained at 1430°C from the FeO+MgO+B precursor (red curve) and at 1410°C from the SnO+MgO+B precursor (black curve). The main peaks peculiar to a BN phase are arrowed. A sharp reflection was assigned to pure Fe (an impurity from the precursor).



**Figure S3.** Raman spectrum of a material obtained at 1300°C from the H<sub>3</sub>BO<sub>3</sub>+MgO+B precursor.



**Figure S4.** EEL spectra of BNO-NPs with petalled surfaces obtained at 1245°C from the SnO+MgO+B precursor. The spectra from the central region (core) and from the near-surface (shell) region are presented. Typical EEL spectrum of hexagonal BN is presented as a reference. C-signals are coming from the TEM grids.