

Supplementary Figures:

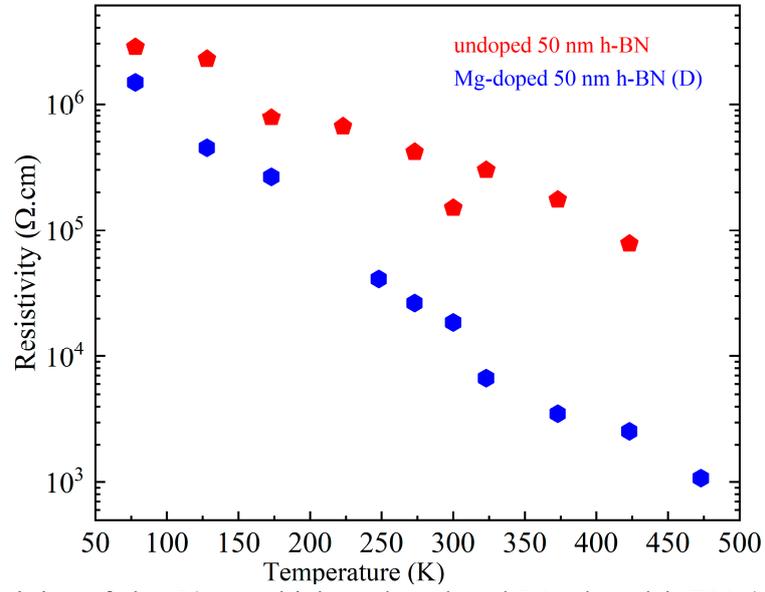


Figure S1: Resistivity of the 50 nm thick undoped and Mg-doped h-BN (sample D) versus temperature.

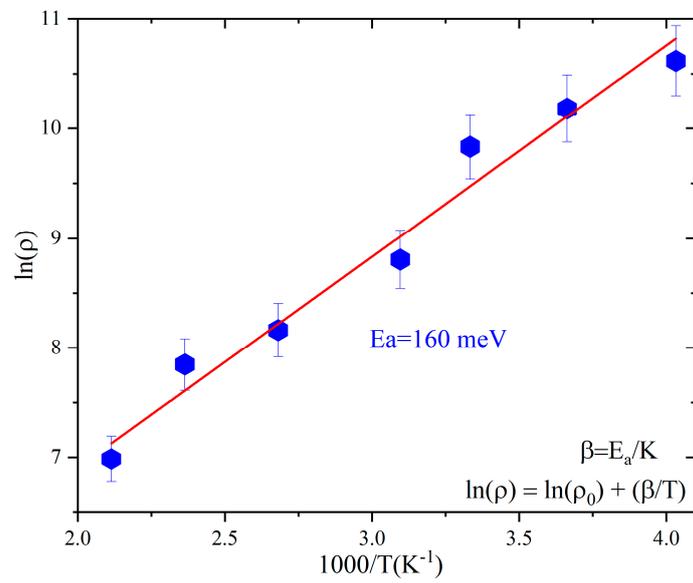


Figure S2: Activation energy of the 50 nm thick Mg-doped h-BN.

The nature of the metal contacts on each junction side has been checked. As shown on Figure S3a and Figure S3b, a linear curve is obtained in each case revealing an ohmic behavior.

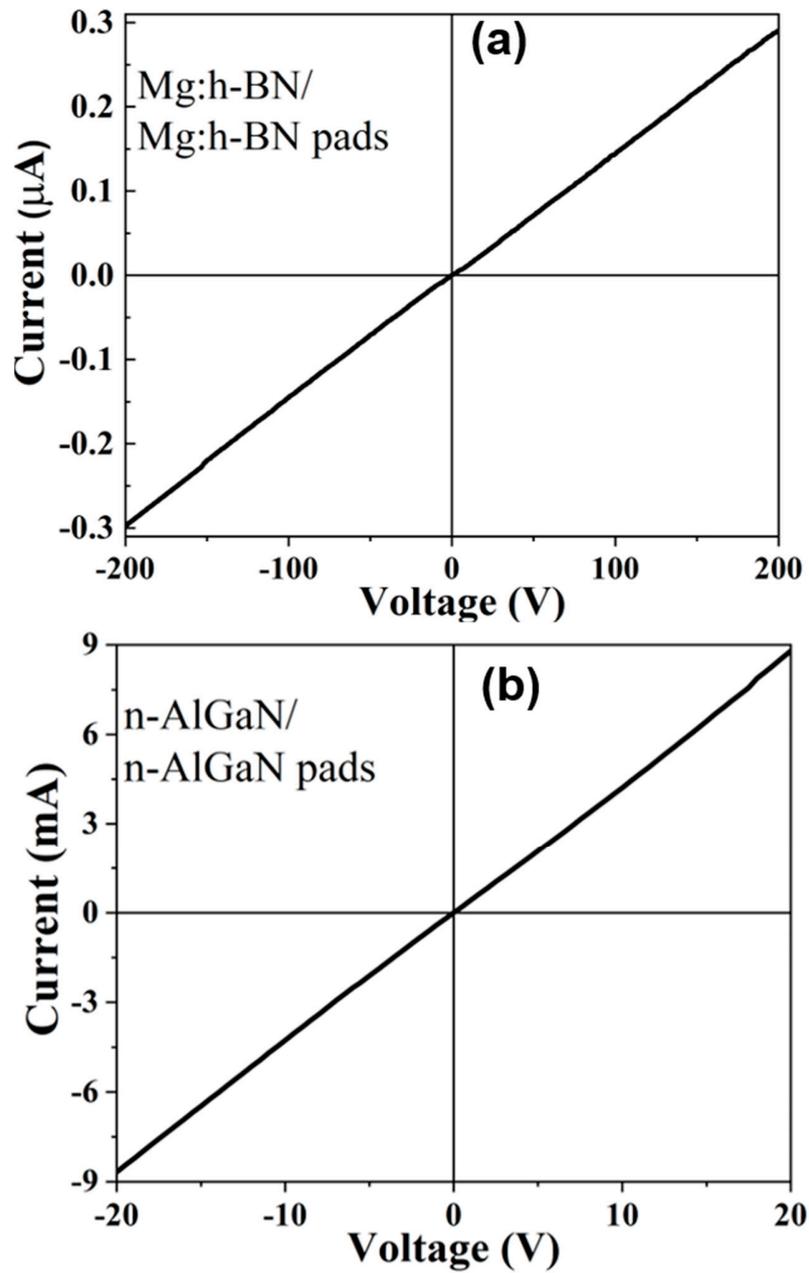


Figure S3: (a), (b): I-V characteristics measured on two Mg doped BN contact pads and two n-AlGaN contact pads.