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Supporting Information

Enhanced Stability and Performance of Few-Layer Black Phosphorus Transistors by Electron Beam Irradiation

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BP exposure to 15 keV e-beam: repeatability of results

Several devices were measured to confirm the repeatability of the effect of e-beam exposure on BP-FETs. Transfer characteristics for some of those devices are shown below in Figure S1. All of these devices were exposed to an exposure energy of 15 keV. The changes obtained in both the devices post e-beam exposure (I_{on} increases by nearly 3×-6× and I_{on}/I_{off} increases by 2×-5×) are similar to the results reported in the main manuscript, hence demonstrating the repeatability of the effect of e-beam on BP-FETs and their functioning.

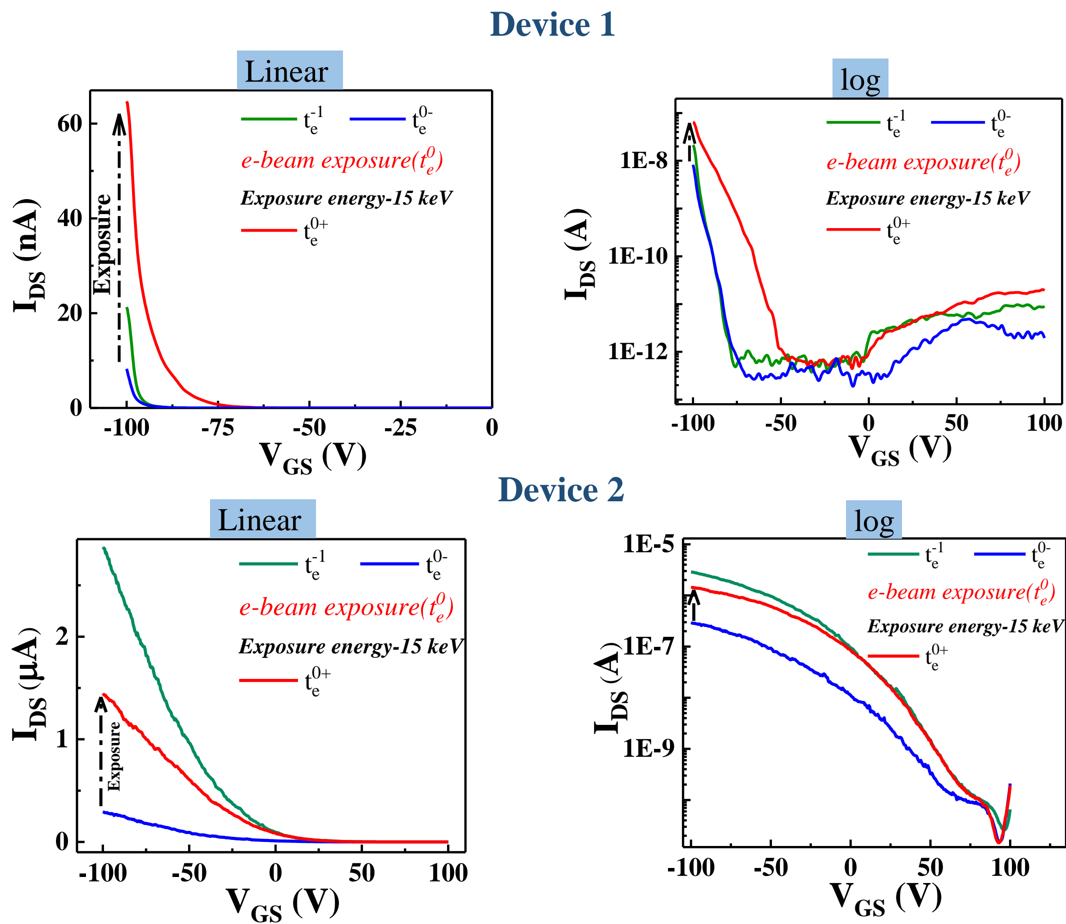

Figure S1: Transfer characteristics of BP-FETs (device 1 and 2) in linear (left) and log (right) scales, showing similar changes in the device characteristics post e-beam exposure.

Effect of e-beam on BP thickness

To ascertain the effect of e-beam exposure on BP thickness, AFM line scans before and after e-beam exposure are shown in Figure S2. The thickness of the flake (15 nm) remains unchanged after exposure to 15 keV e-beam. Therefore, we conclude that e-beam irradiation reduces BP surface roughness (Figure 9 main manuscript) but doesn't have a significant impact on the thickness.

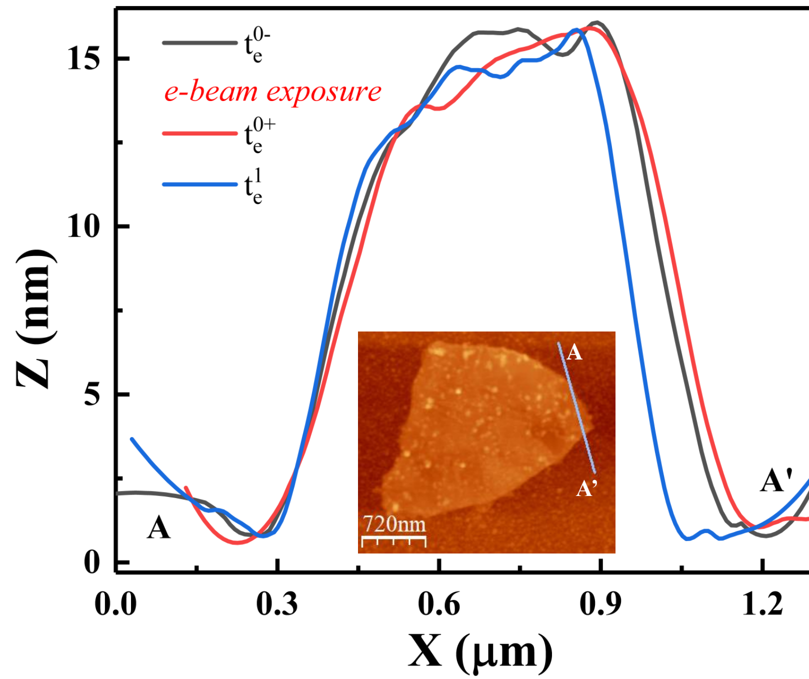

Figure S2: AFM line scans of BP flake before e-beam exposure (t_e^{0-}), immediately after e-beam exposure (t_e^{0+}) and 24 hrs post exposure (t_e^{1}).