

Supporting information

Direct imaging of carriers funnelling in a dielectric engineered 2D semiconductor

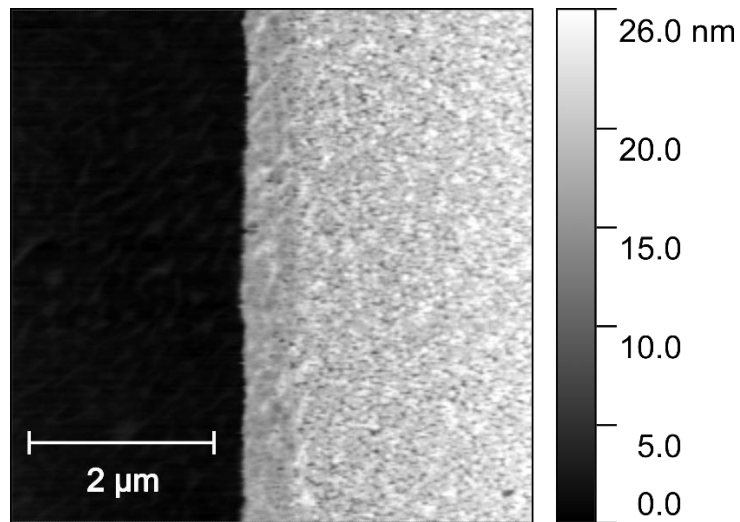
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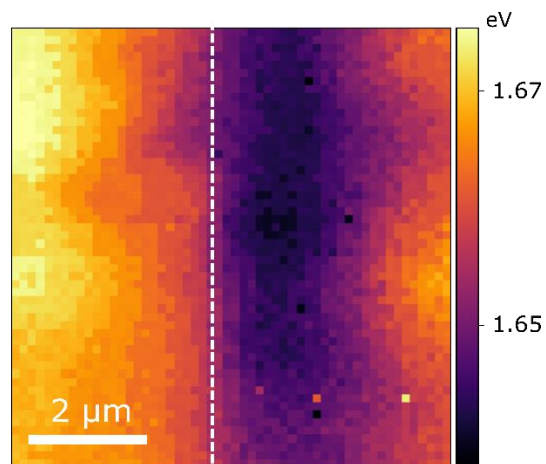
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Supplementary Note 1



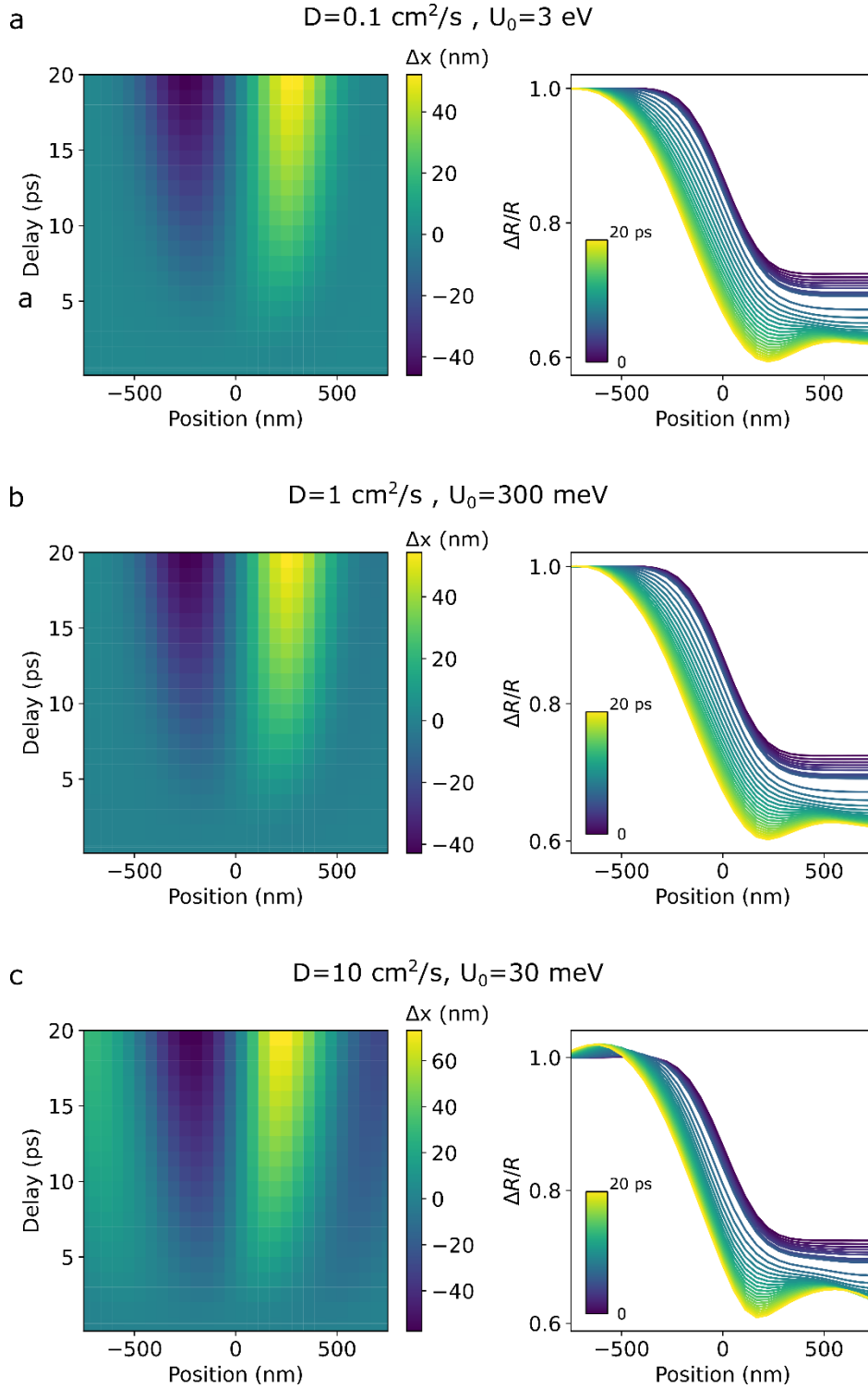
Supplementary Figure 1: AFM height map of the heterostructure, measured in tapping mode.

Supplementary Note 2



Supplementary Figure 2: Map of the transition energy extracted from PL spectra for a non-annealed sample. Dotted line represents the edge of the HfO₂ patch. Compared to Figure 1.d the shift in the transition energy across the junction is larger, smoother, and less homogeneous. This suggest that strained induced by the ALD deposition is relaxed by annealing.

Supplementary Note 3



Supplementary Figure 3: Comparison between of the simulation results for different diffusion constants D but keeping $D\sqrt{U}$ constant. Left: Map of the Δx shift, right: time evolution of $\Delta R/R$ for (a) $D = 0.1 \text{ cm}^2/\text{s}$ and $U_0 = 3 \text{ eV}$ (b) $D = 0.1 \text{ cm}^2/\text{s}$ and $U_0 = 300 \text{ meV}$ and (c) $D = 10 \text{ cm}^2/\text{s}$ and $U_0 = 30 \text{ meV}$.