Supporting Information

Arrays of aligned supramolecular wires by macroscopic orientation of columnar-discotic mesophases

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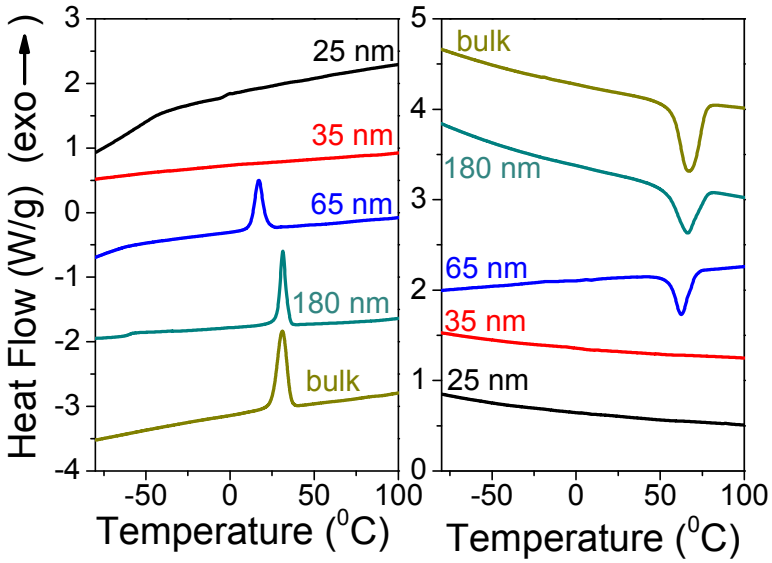

Figure S1. Cooling (left) and subsequent heating (b) thermograms of bulk HBC-Br and of HBC located inside self-ordered AAO with pore diameters ranging from 200 to 25 nm obtained with a heating/cooling rate of 10 K/min.

Schulz-scans for the inter-columnar (100) peak at 353 K are depicted in Figure S2.

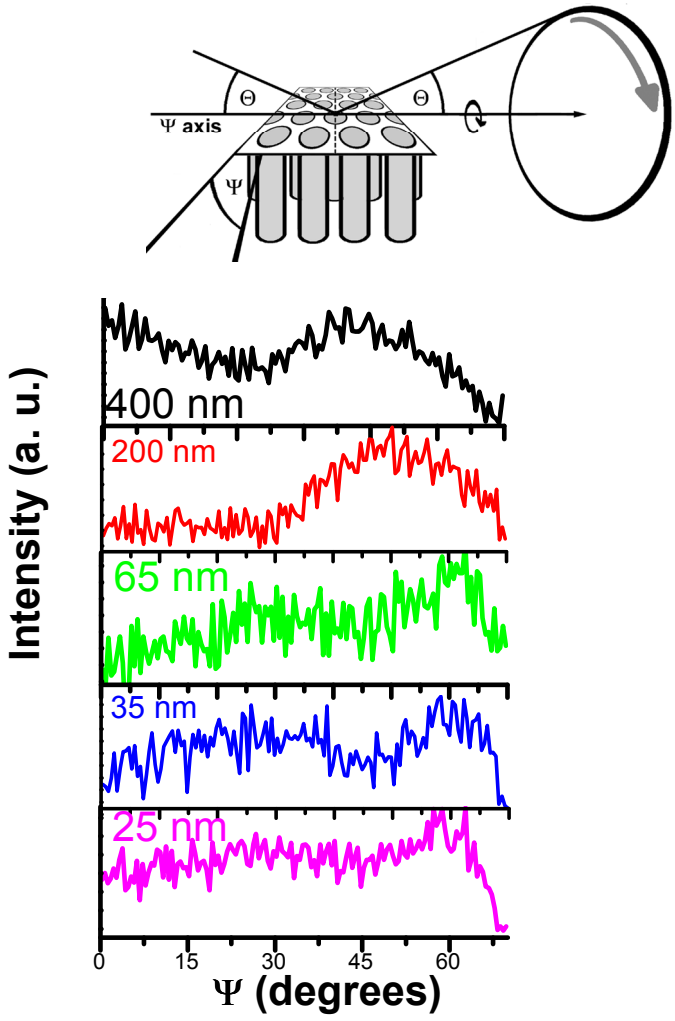

Figure S2. (Top): Schematic diagram of the geometry used for Schulz scans. During Θ/2Θ scans the AAO is tilted about an axis lying in the plane of the AAO surface (perpendicular to the AAO nanopore axes) oriented perpendicular to the scattering plane. During Schulz scans, Θ and 2Θ are fixed. The sample is tilted about the Ψ axis that lies in the plane of the AAO surface and in the scattering plane. The Ψ axis is oriented perpendicularly with respect to the Θ/2Θ axis and the AAO pore axes. Thus, Schulz scans probe the scattering intensity along a Debye ring (on the right) belonging to the fixed scattering angle Θ. (Bottom): Schulz-scans for the inter-columnar (100) peak.

The results from the Θ-2Θ scans at 298 K are depicted in **Figure S3**.

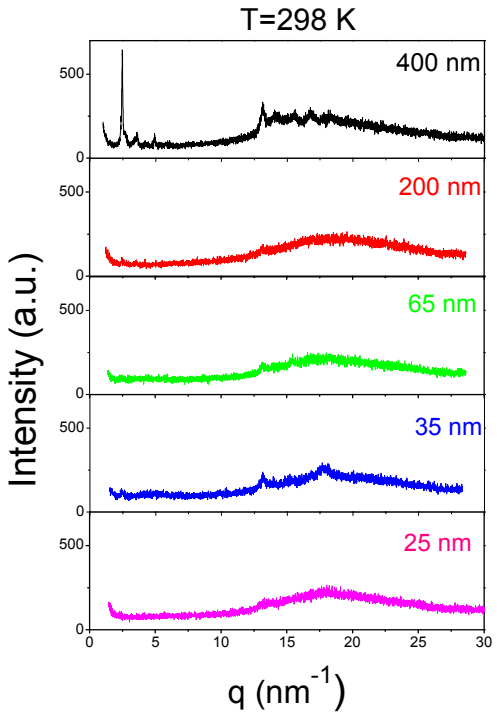

Figure S3. Θ/2Θ scans of the C_r phase measured at 298 K. The AAO surface was oriented perpendicularly to the plane of the incident and scattered X-ray beams.

The relaxation times at maximum loss are summarized in **Figure S4**.

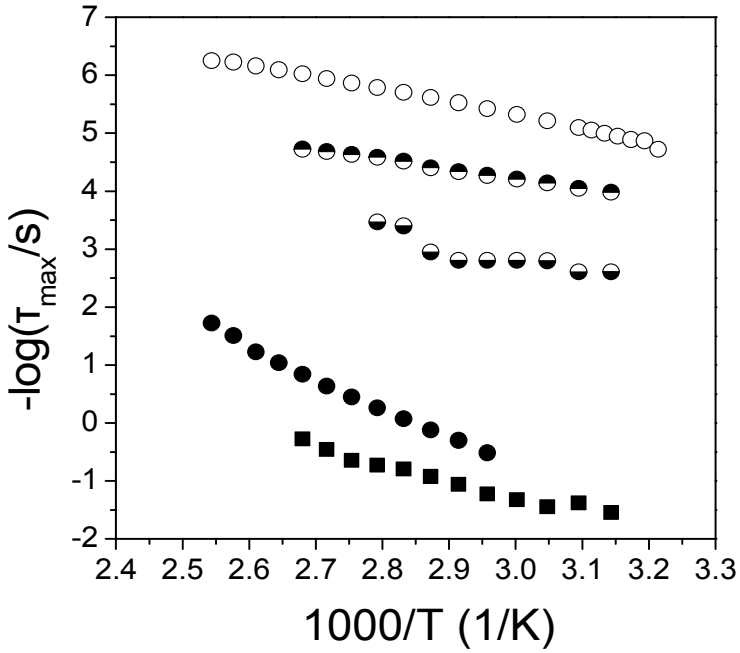

Figure S4. Temperature dependence of the disk axial motion (open spheres) and the slower DS mode (filled spheres) in bulk HBC-Br and in HBC-Br located inside self-ordered AAO with a pore diameter of 200 nm. The half-filled squares correspond to the times of the bimodal disk axial motions and the filled squares to the slow mode.

I-V measurements.

A device structure of AAO/HBC-Br/Al/ITO was employed for testing the conducting properties of the confined HBC-Br. Therefore, Al (100 nm) was thermally evaporated onto the HBC-Br located inside self-ordered AAO with pore diameters of 200 nm and 25 nm. Patterned ITO substrates were cleaned by immersion in an ultrasonic bath followed by rinsing with acetone and isopropanol. Finally the ITO substrates were exposed to argon plasma for 15 min. Subsequently, the AAO/HBC-Br templates were fixed onto the ITO substrate with conductive carbon paste. Note that we did not open the hemispherical pore bottoms of the AAO pores, which consists of barrier oxide with a thickness of a few ten nm. The current-voltage characteristics were recorded with a Keithley 2400 source measurement unit spanning -25 to 150 V in 1 V steps. **Figure S5** gives the I-V characteristic curves for the two samples at two temperatures. Despite the presence of the barrier oxide separating the HBC-Br inside the AAO pores and the conductive carbon paste, it can be seen that the high temperature LC phase with the uniform columnar orientation results in the higher current. Similar currents are obtained for both HBC-Br located inside self-ordered AAO with pore diameters of 200 and 25 nm at 110^{o}C because in both cases there exist well-ordered cores of HBC-Br columns oriented along the AAO axes. As expected, at lower temperatures the very weak orientation of the HBC-Br molecules gives rise to smaller currents for the same applied voltages. Further studies of DLCs embedded in AAO templates as a function of the core size will send more light on the semiconducting properties of DLCs.

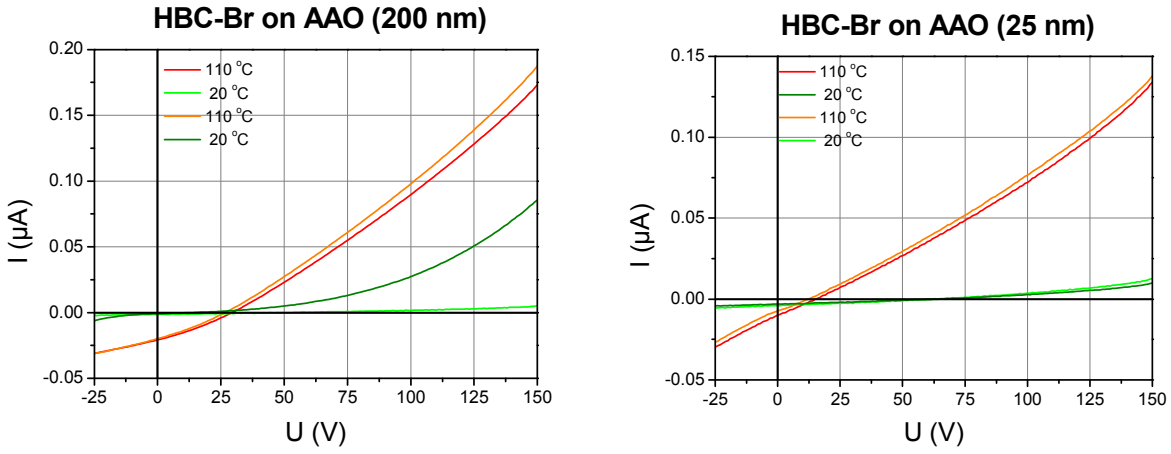

Figure S5. I-V characteristics for HBC-Br located inside self-ordered AAO with pore diameters of 200 nm (left) and 25 nm (right) shown at two temperatures.