Supplemental Information (SI)

Low-Frequency Electronic Noise in Superlattice and Random-Packed Thin Films of Colloidal Quantum Dots

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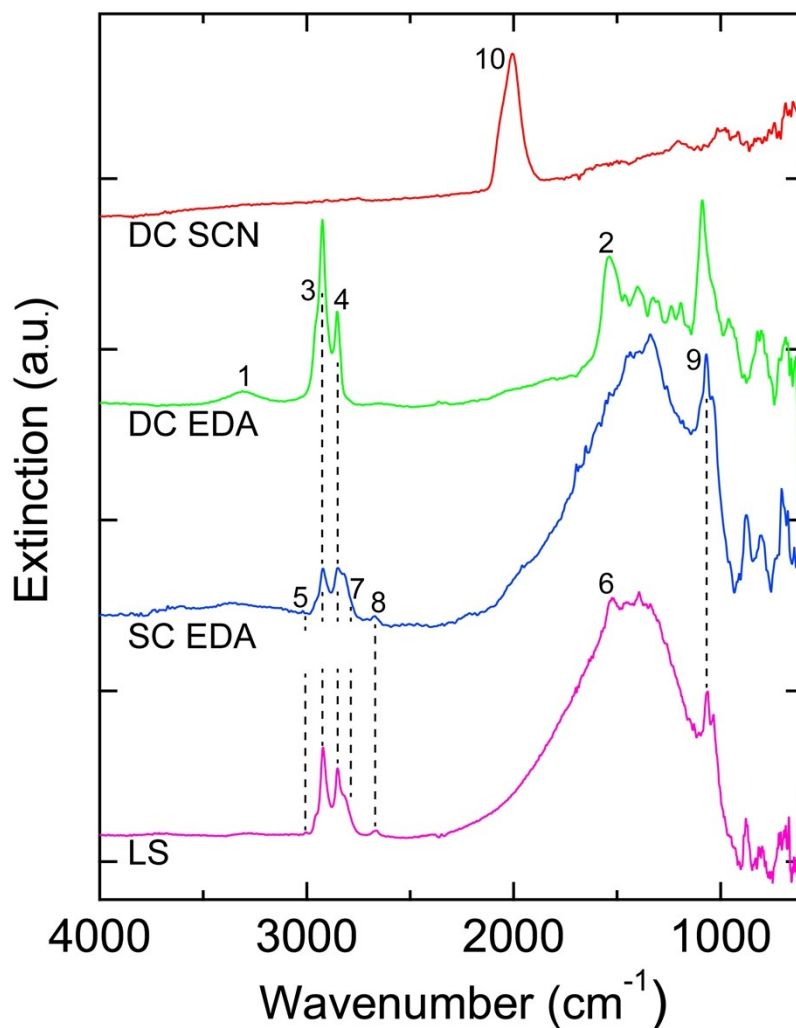
Figure S1: Fourier transform infrared spectra of the QD films in this study. Spectra of typical DC SCN, DC EDA, SC EDA, and SL films on silicon substrates. All samples were measured prior to ALD infilling. The labeled peaks were assigned as follows: peaks 1-2 are adsorbed ethylenediamine (1: $v(NH_2)$, 2: NH_2 scissor), peaks 3-4 are adsorbed oleate and ethylenediamine (3: $v_{as}(CH_2)$, 4: $v_s(CH_2)$), peaks 5-6 are unique to oleate (5: $v(HC=CH)$, 6: $v_s(COO^-)$), peaks 7-9 are adsorbed ethylene glycoxide (7: $v_{as}(CH_2)$, 8: $v_s(CH_2)$, 9: $v(C-O)$ and $v(C-C)$), and peak 10 comes from adsorbed thiocyanate (10: $v(C\equiv N)$). The ligand content of each film is summarized in Table S1.

**Table S1: Ligand content of the films**

| film type	oleate	glycoxide	ethylenediamine	thiocyanate
DC SCN	no	no	no	yes
DC EDA	residual*	no	yes	no
SC EDA	yes	yes	no	no
SL	yes	yes	no	no

* The presence of the ligand cannot be ruled out, but if present it is at a low concentration.
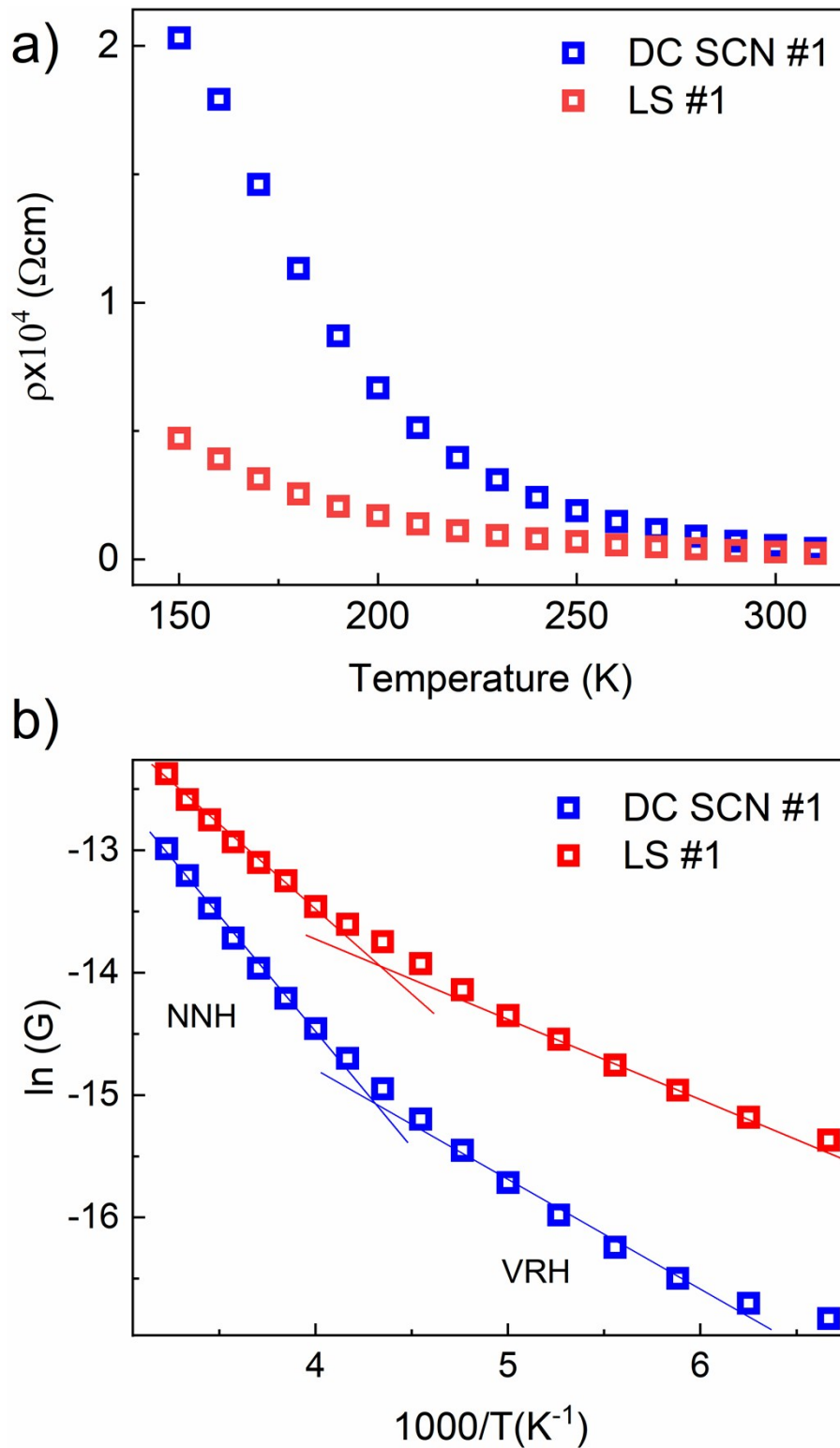
Figure S2: (a) Resistivity as a function of temperature. (b) Resistivity as a function of the inverse temperature. The data are shown for the random (DC SCN#1) and ordered (LS#1) quantum dot samples.
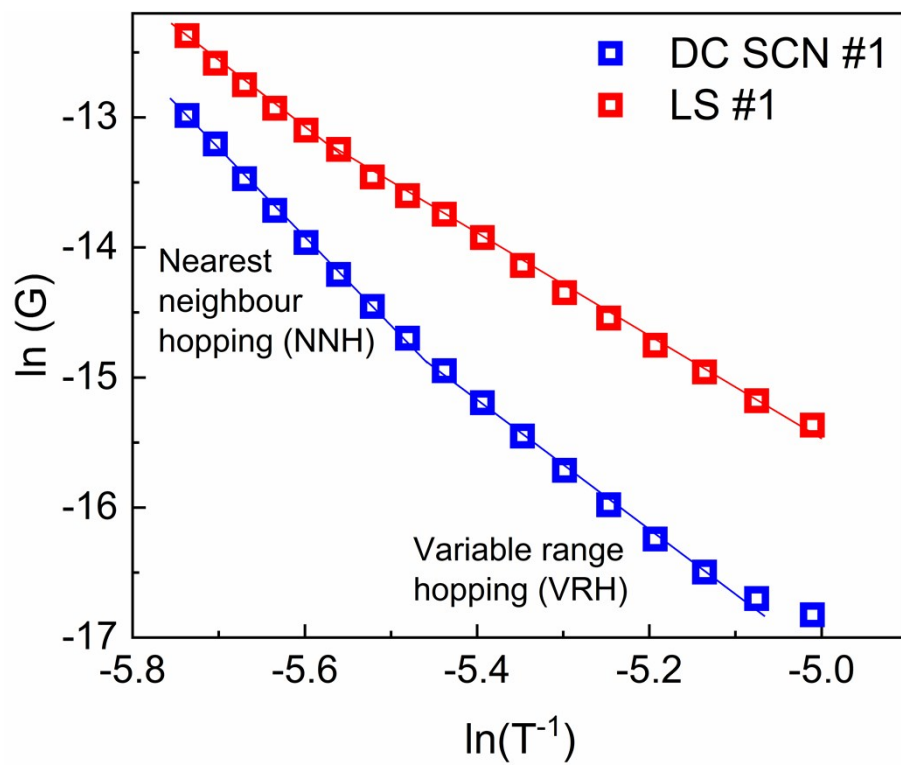
Figure S3: Logarithmic plot of the electrical conductivity as a function of inverse temperature for the random (DC SCN#1) and ordered (LS#1) quantum dot samples.
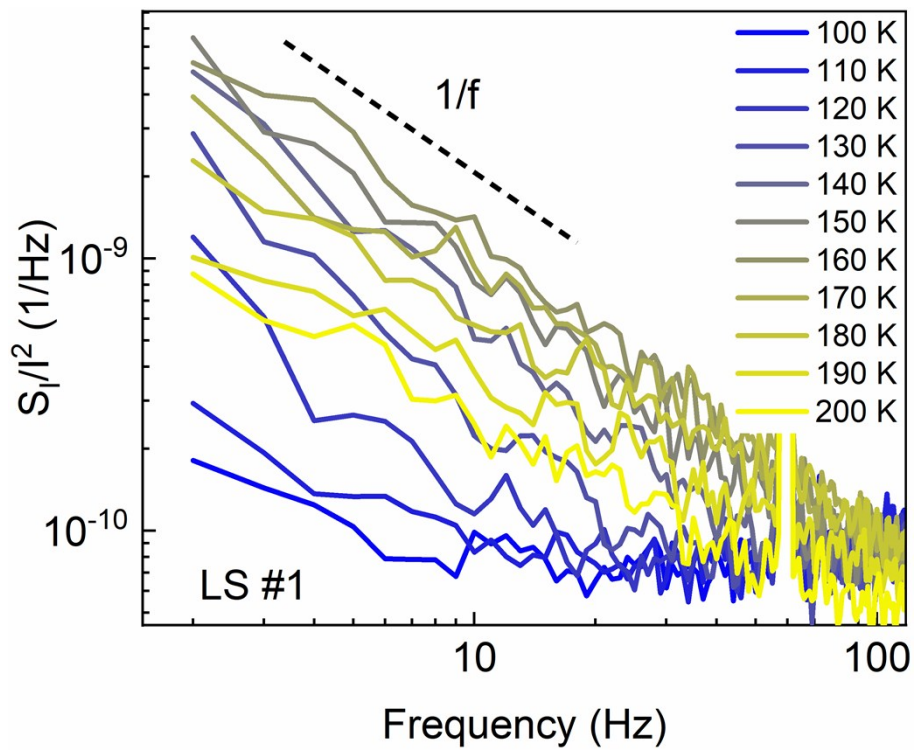
Figure S4: Normalized noise spectral density as a function of frequency measured at different temperatures for the ordered QD sample.
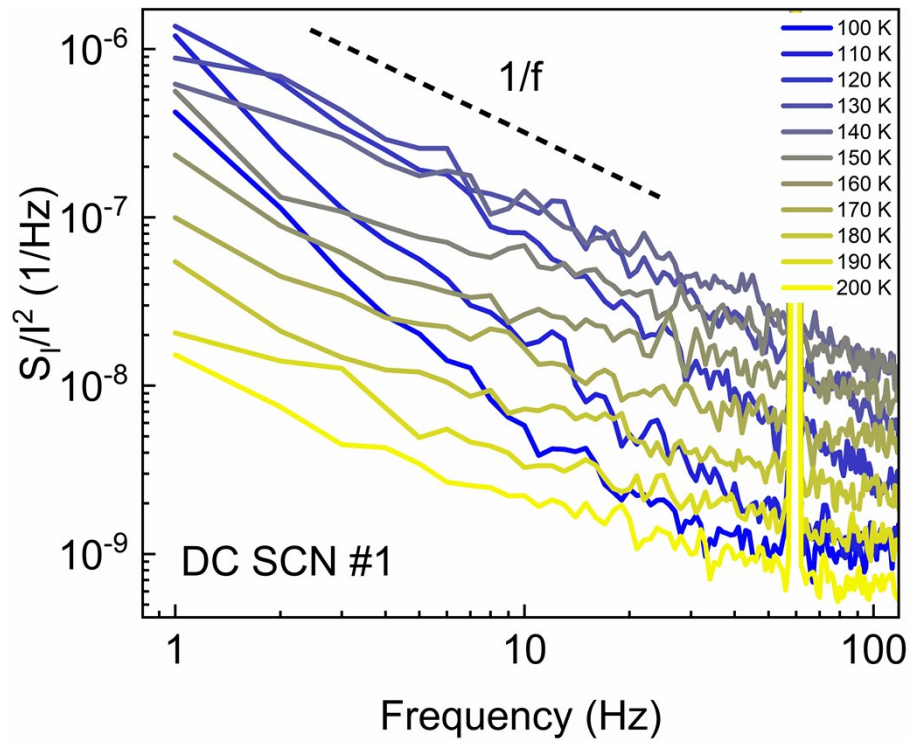
Figure S5: Normalized noise spectral density as a function of frequency measured at different temperatures for the random QD sample.