Electronic Supplementary Information

Large-scale controlled coupling of single-photon emitters to high index dielectric nanoantennas using AFM nanoxerography

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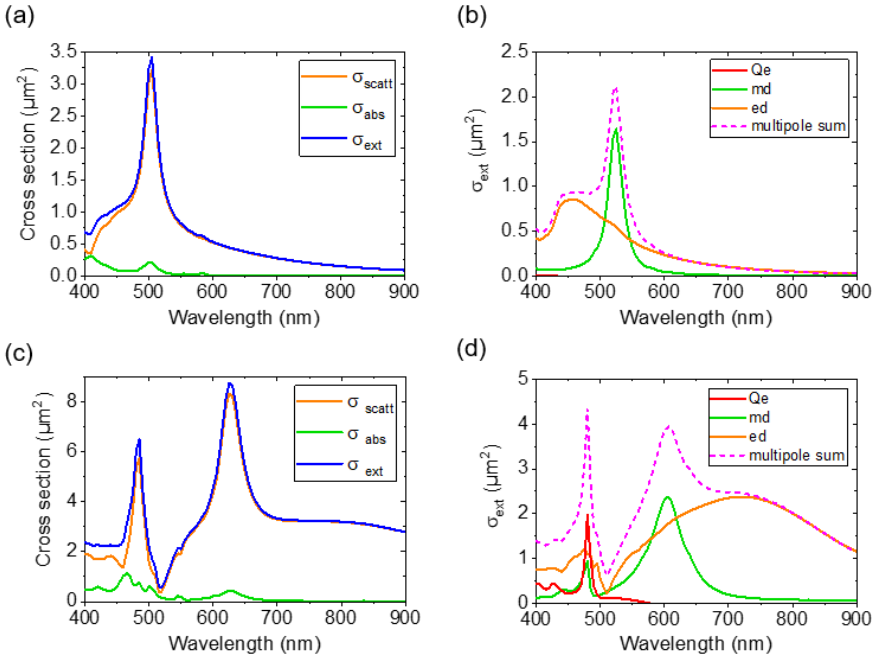

Figure S1: Simulated resonance spectra for two dimers of dimensions W = 80 nm, L = 130 nm, H = 90 nm, G = 100 nm ((a) and (b)) and W = 130 nm, L = 280 nm, H = 90 nm, G = 100 nm ((c) and (d)) illuminated by a plane wave polarized perpendicular to the dimer long axis (TE illumination): (a) and (c) Extinction (blue), scattering (orange) and absorption (green) cross-sections. (b) and (d) Multipole decomposition showing the electric quadrupolar (Qe - red), magnetic dipolar (md - green) and electric dipolar (ed - orange) mode contribution to the extinction spectrum and the sum of all multipolar contributions (pink dashed line).

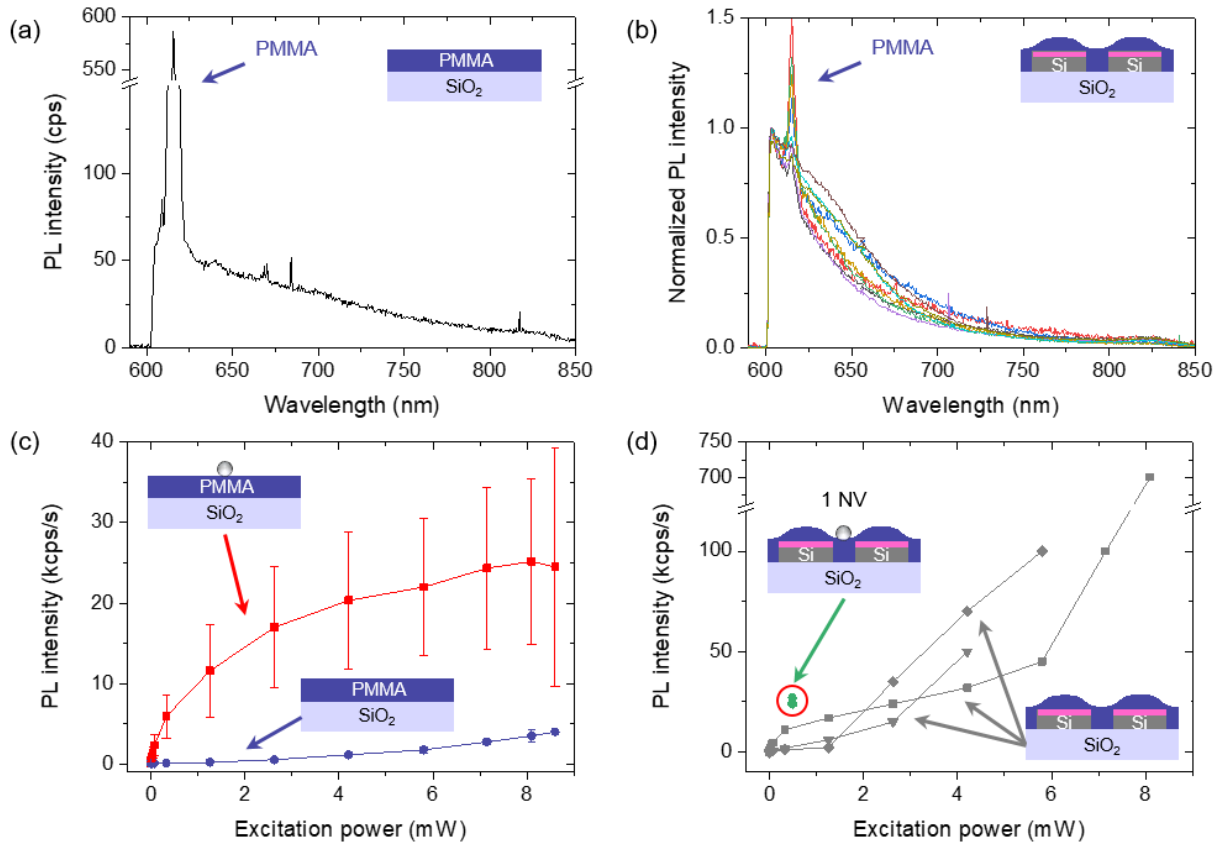

Figure S2: PMMA luminescence: (a) Emission spectrum recorded on a 90 nm thick PMMA film on a silica substrate, without any NDs. (b) Emission spectrum recorded on several dimers (each spectrum corresponding to a different dimer) covered by a 90 nm thick PMMA film. (c) Dependence of the PL intensity measured on isolated NDs deposited on 90 nm of PMMA (red squares) and measured on the PMMA film without NDs (purple dots) with the excitation power. (d) Dependence of the PL intensity measured on a ND assembly hosting a single NV centre (green dots) and measured on 3 dimers covered by 90 nm of PMMA (grey diamonds, triangles and squares) with the excitation power.

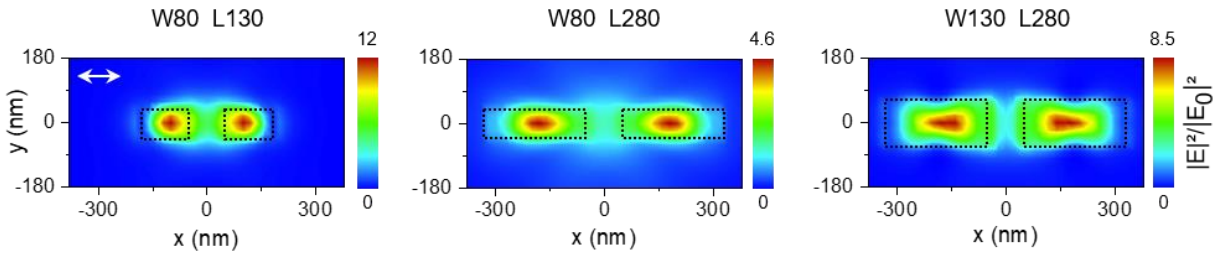

Figure S3: Simulated electric field intensity distribution in the xy plane, 15 nm above 3 silicon dimers of different widths W and lengths L (both in nanometers) and with a gap G = 100 nm, when illuminated by a plane wave at 520 nm polarized along the dimer long axis. Black, dashed dots indicate the dimer edges.

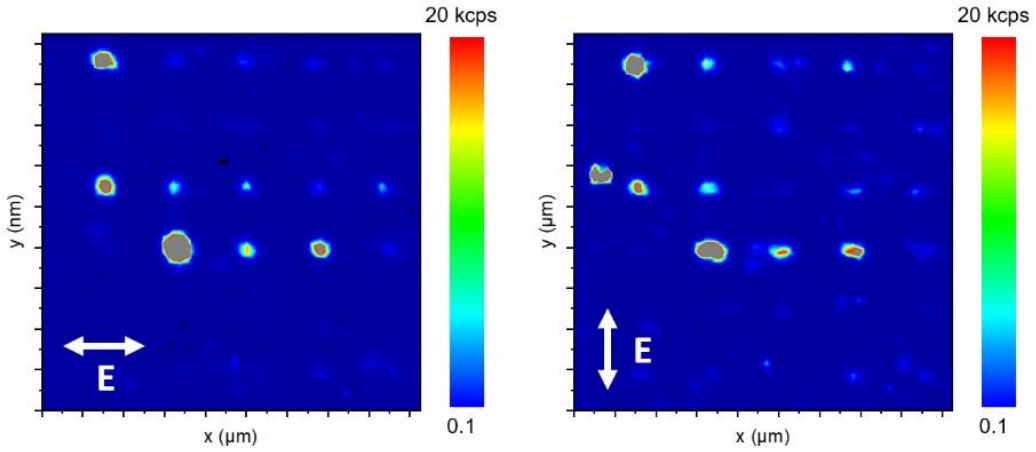

Figure S4: 18 µm x 18 µm PL color maps of 30 assemblies of NDs in the 100 nm gap of Si dimers for an incident laser illumination linearly polarized either parallel (left) or perpendicular (right) to the main axis of the dimers.

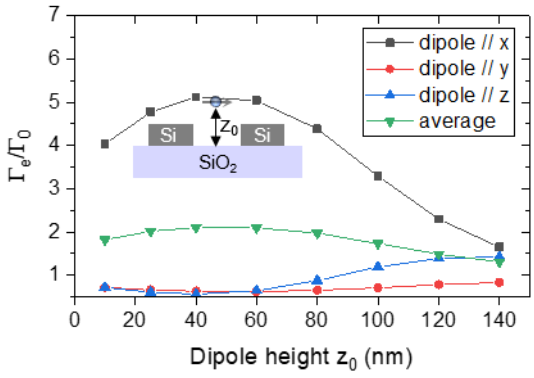

Figure S5: Simulated evolution of the normalized decay rate in the gap of a dimer W80 L130 G100 as a function of the height z_0 of an electric dipole emitting at 700 nm, for different dipole orientations. The inset shows a sketch of an electric dipole oriented along x and located at a height z_0 from the surface, in the gap of a silicon dimer.

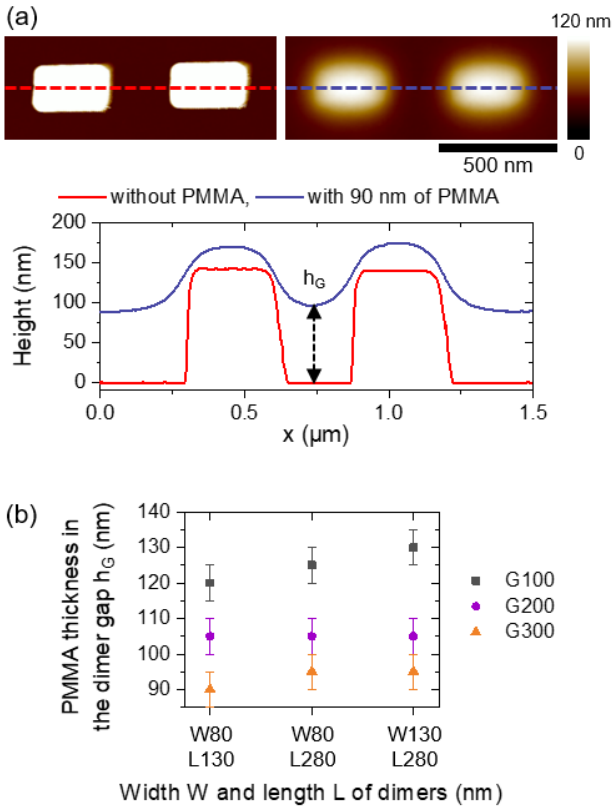

Figure S6: Effects of PMMA spin-coating on top of dimers: (a) Top: AFM topography images of a W130 L280 G300 dimer before (left) and after (right) spin-coating of a 90 nm thick PMMA film. Bottom: height profiles from the AFM topographies without and with the PMMA film. The profile after spin-coating (in purple) is plotted with an offset of +90 nm to facilitate the lecture of the absolute height of PMMA and represent the covering of the Si dimer. (b) Evolution of the PMMA thickness in the gap of dimers depending on their dimensions and for the different gap sizes.