

Dynamics of nanocubes embedding into polymer films interrogated via spatially resolved plasmon modes

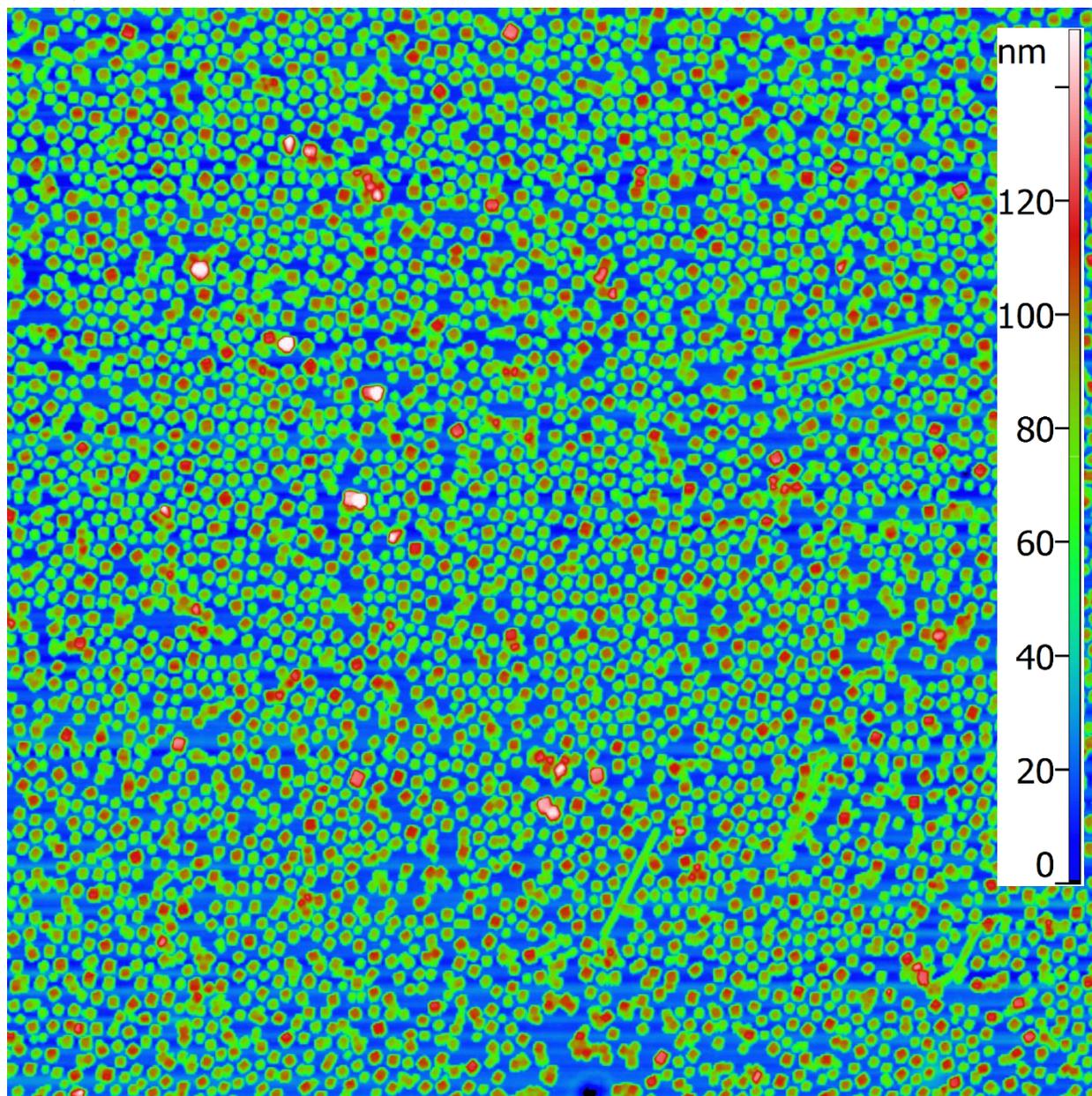
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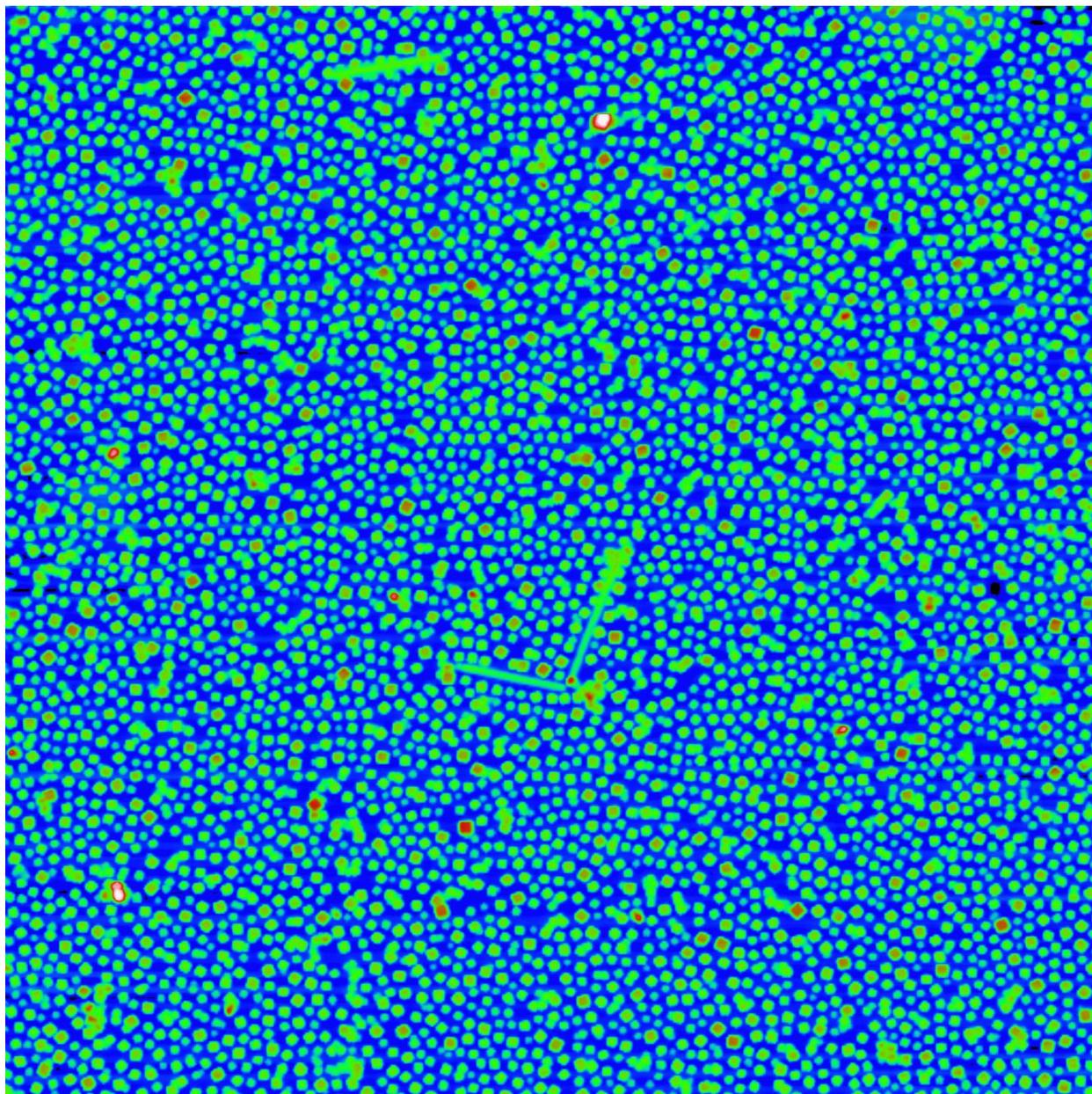
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KEYWORDS: Polymer thin film, Embedding, Silver Nanocubes, Nanoruler, Plasmon Hybridization, Optical Material, Nanocomposite

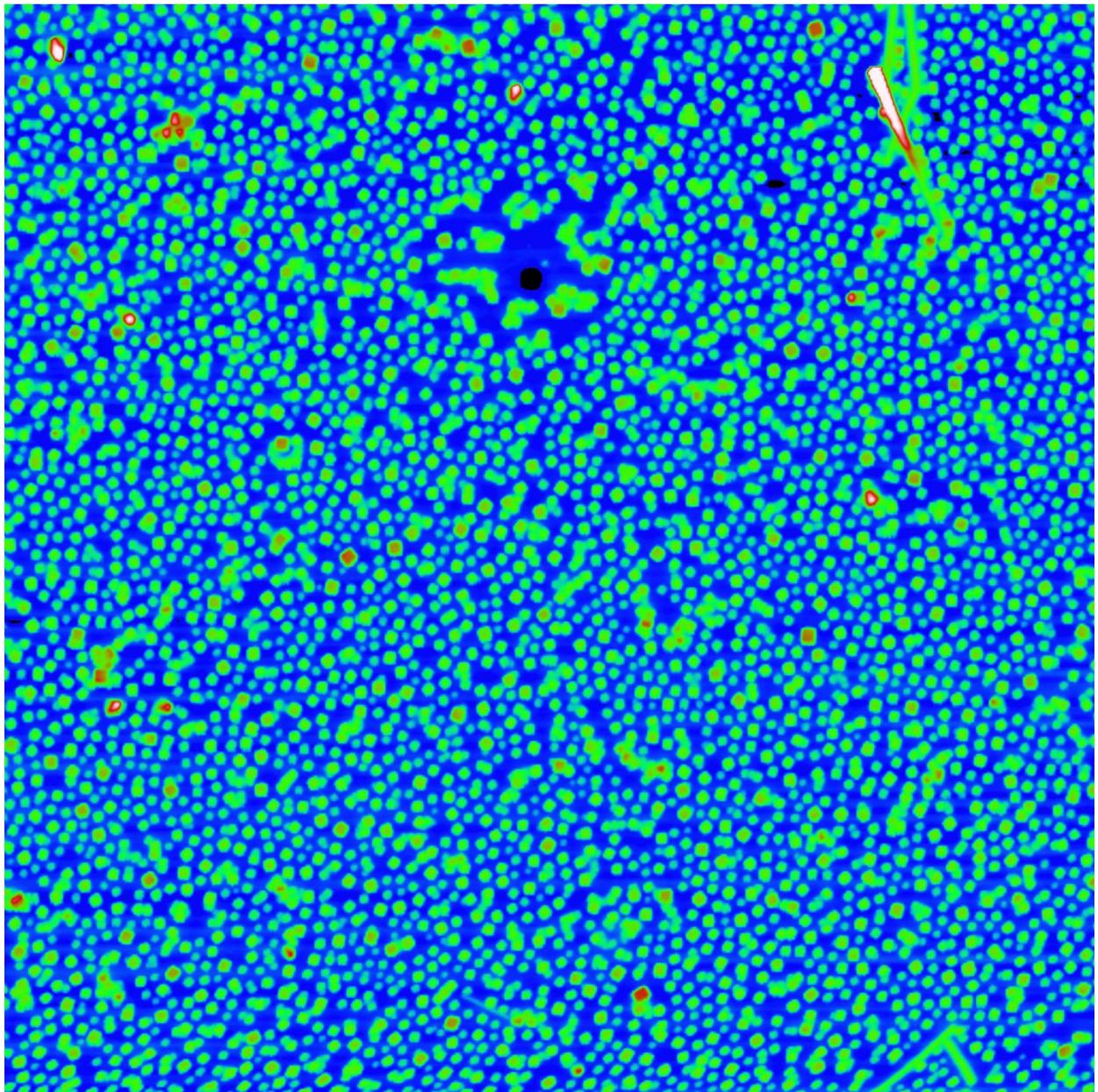
0 min, 75 nm



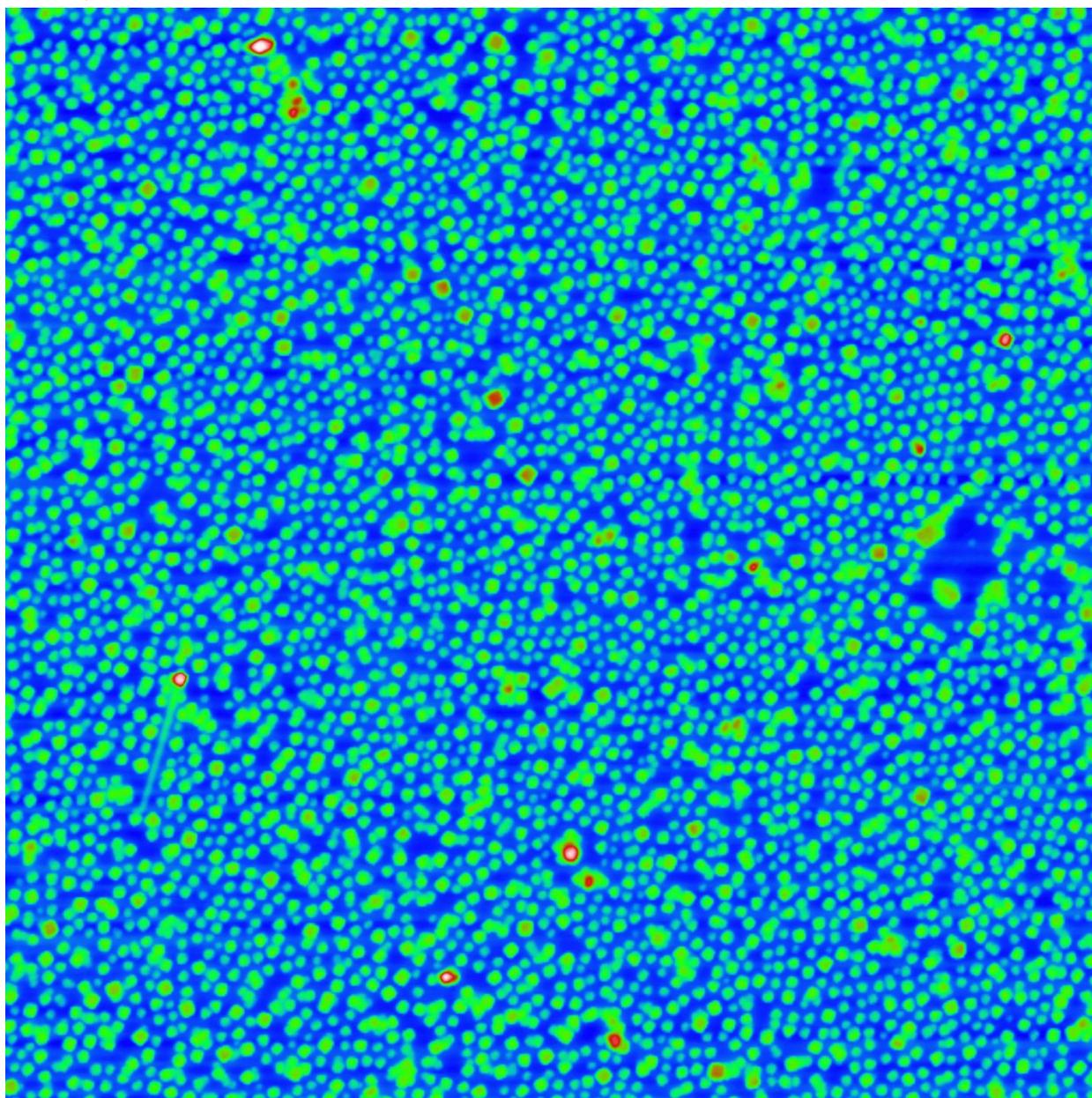
2.5 min, 60 nm



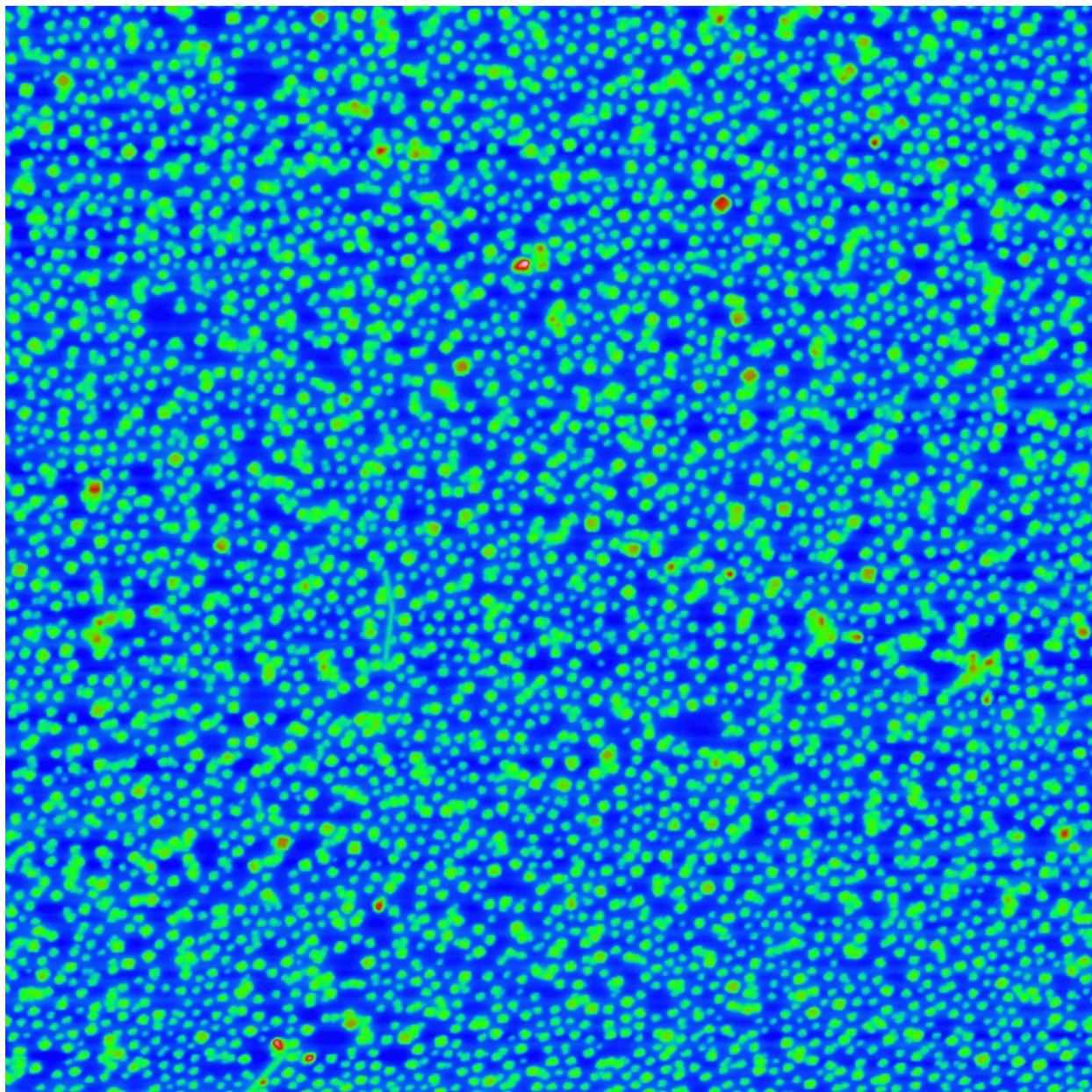
7 min, 44 nm



15 min, 35 nm



21 min, 23 nm



41 min, 8 nm

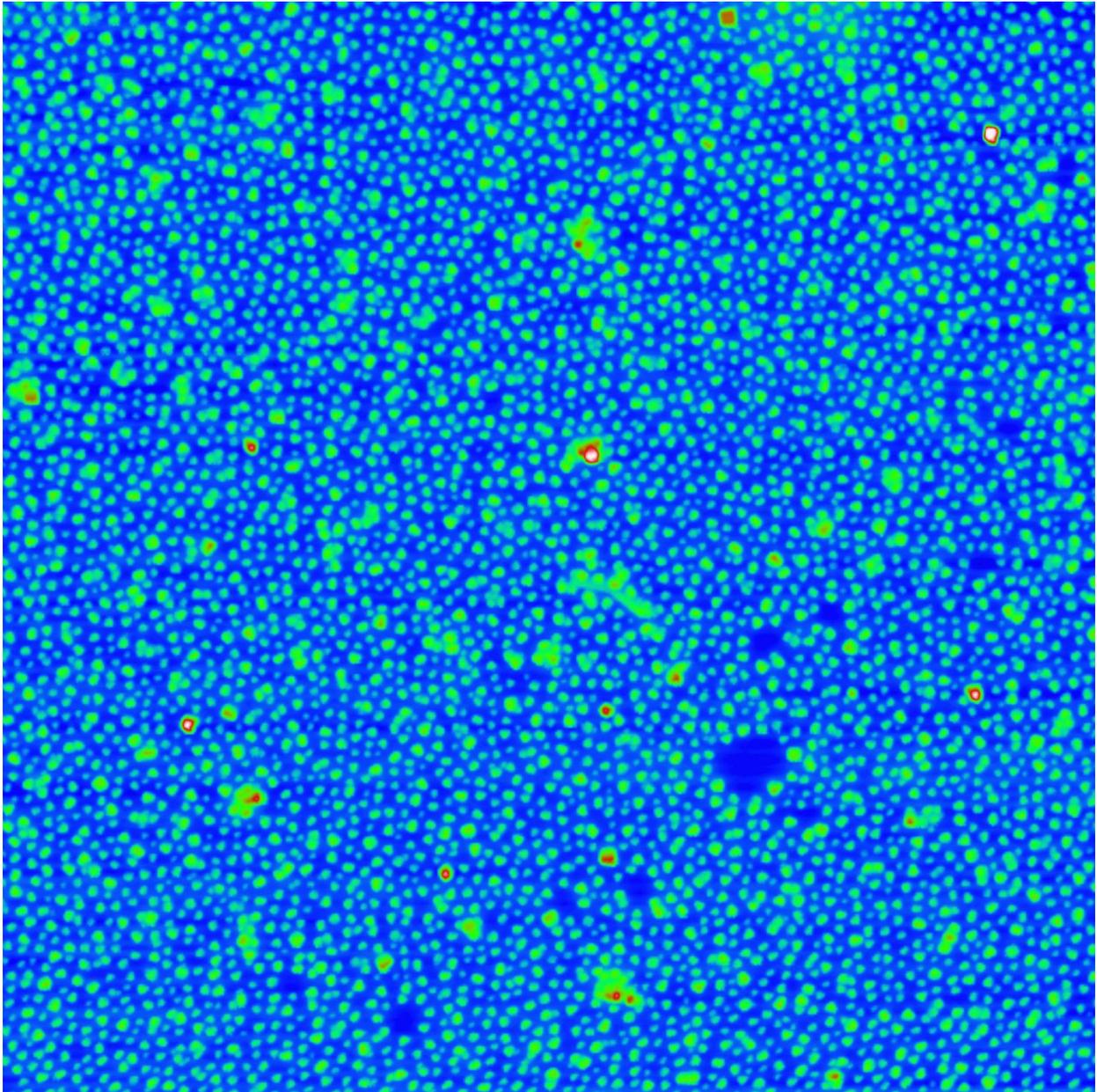


Figure S1 - Topographical evolution of a nanocube monolayer visualized by AFM. Average exposed cube height and duration of heating are indicated for each panel. The average height was determined by performing a statistical analysis of entire AFM images. Height histograms were obtained for each image. The two main peaks in the histograms were used as a measure of the substrate level and the cube level. By fitting the two peaks with Gaussian curves, values for the average height of the substrate and the cubes were obtained. The difference between them was used as the average exposed nanocube height.

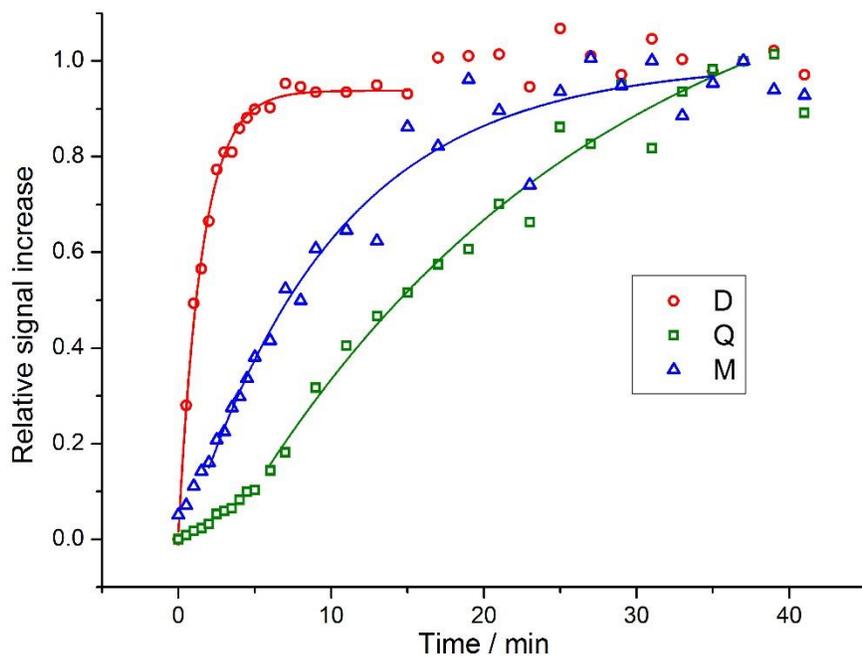


Figure S2. Evolution of plasmonic modes. Relative change in wavelength of the dipolar resonance (red circles, relative change in intensities of the multimode resonances (blue triangles), and relative change in the wavelength of quadrupolar resonance (green square) versus time

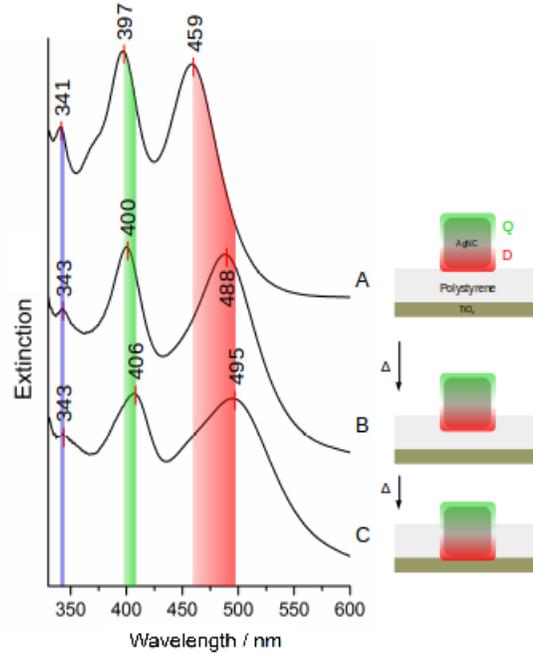


Figure S3. Experimental schematic: A monolayer of silver nanocubes deposited via the Langmuir-Schaefer technique onto a thin 50nm film of polystyrene on a 20nm thin film of high refractive index titanium oxide. As the system is heated near the glass transition temperature of the underlying polymer the nanocubes begin to diffuse into the polymer layer. The position of the nanocubes and corresponding extinction spectrum are shown for the initial (A), intermediate (B), and final (C) position. Due to the high refractive index of the underlying titanium oxide, the D mode shifts further when compared to polystyrene on glass system. The Q mode only shifts marginally as the cubes themselves are larger than the polymer layer and a large portion of the cube remains exposed keeping the Q mode sensitive to the surrounding environment (air) above the composite material