

## Floating Nanometric Poly(methyl methacrylate) Films by Bursting Bubbles - Supplementary material

### Bubble and Nanolayer Optical Visualization Setup

To control, visualize and reproduce the experiments, a homemade setup was built, consisting of a methacrylate container with a tiny hole at the bottom to facilitate the insertion of the syringe needle. Two high-speed cameras were positioned at the container's top and side. Two lamps were used to improve image capture.

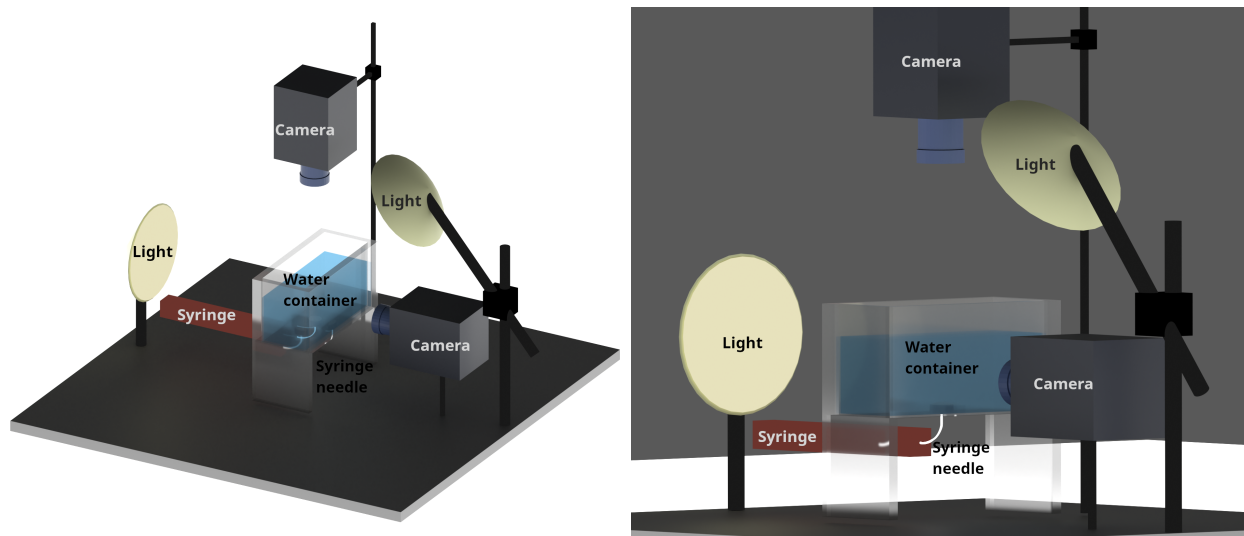


Figure 1: 3D scheme of the setup to visualize bubbles underwater, and bubbles and nanolayers on the water surface

## Nanoparticles Microscopic Identification

Neodymium -doped nanoparticles with chemical formula 4 at.%  $\text{Nd}^{+3}:\text{LiYF}_4@ \text{LiYF}_4$  were synthesized by the thermal decomposition method<sup>[2]</sup>. Once the synthesis was completed, they were precipitated with ethanol for subsequent dispersion in chloroform. These luminescent nanoparticles were analyzed with High-resolution transmission electron microscopy to know their shape, and size and to corroborate the existence of individual nanoparticles without being agglomerated. Figure 2 shows the individual synthesized rhomb-shaped nanoparticles.

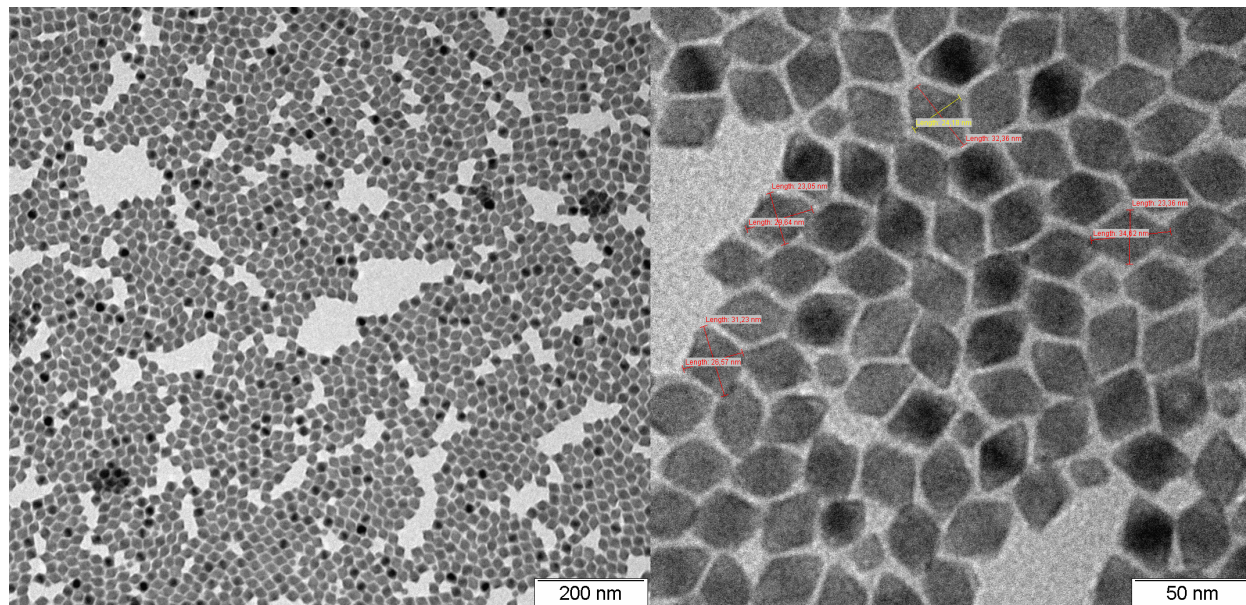


Figure 2: Results of high-resolution transmission electron microscopy of 4 at.%  $\text{Nd}^{+3}:\text{LiYF}_4@ \text{LiYF}_4$  nanoparticles, dispersed in chloroform. B) Magnification of the nanoparticles showing their distinctive rhomboid shape.

## Polystyrene nanolayer

A solution consisting of 5% polystyrene and 95% chloroform was prepared following the procedure described in Materials and Methods section. Similarly, the corresponding fabricated polymeric nanolayer and its characterization were performed as described for the PMMA polymer in section 3.1 Layer fabrication.

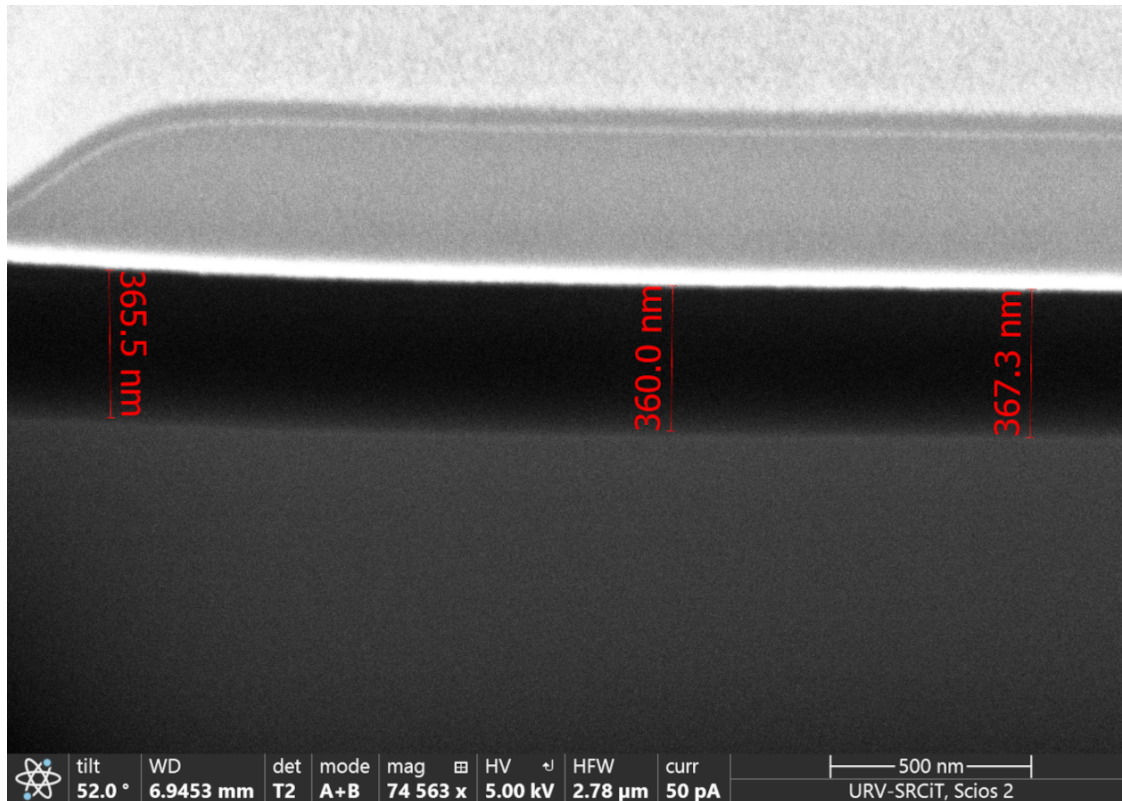


Figure 3: Cross-section of the polystyrene polymer fabricated with the Field Emission Scanning Electron Microscopy combined with Focused Ion Beam