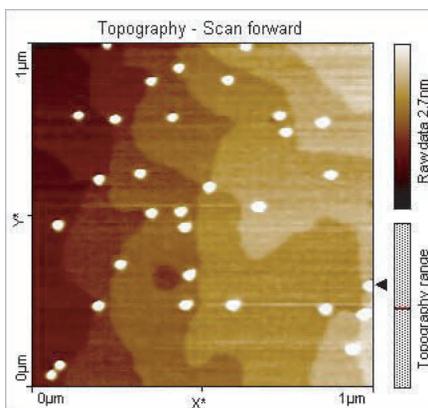


Quantum Dots

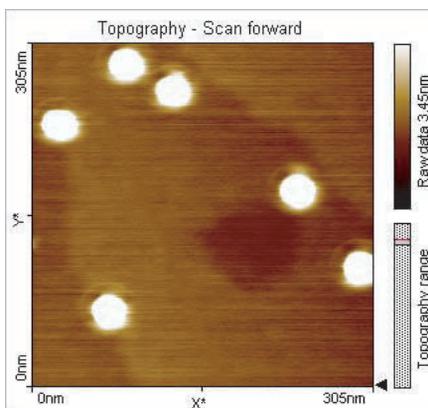
Nanosurf® AFM Application Note

Quantum dots (Q-dots) are particles whose size is limited to a few nanometers. More precisely, a Q-dot is a sphere with a radius of few nm that can confine an electron in zero-dimension; hence the name "dot". What makes Q-dots interesting is that their physical properties are controlled by their small size. In semiconductor research this has led to novel applications in optoelectronics including fluorescence, lasing, nonlinear optical effects, and other optoelectronic applications such as ultra-fast switching.

It was in the early 80s when the first Q-dots were successfully fabricated for the first time. Their fabrication is based on the growth of a semiconductor crystal of atomic dimensions. The construction of Q-dots took two separate paths. In one method the dot is constructed using micro fabrication techniques, which has the disadvantage of creating one Q-dot at a time. In the second method the Q-dots are grown by means of a chemical reaction.



The upper image on the left hand side was measured with the Mobile S AFM using a high resolution scan head. The white particles are 30nm large Q-dots. The mono atomic terraces in the underlying surface are clearly visible and prove the quality of the measurement.



The lower image on the left hand side is a zoom into the previous image. It shows the perfectly round shape of the Q-dots.