



FWF SFB INFRARED OPTICAL NANOSTRUCTURES

# IR-ON SEMINAR

## In situ scanning tunneling microscope during III-V molecular beam epitaxy growth

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High density arrays of Quantum dots (QDs) can easily be grown by 'self-assembled' methods. These QDs are strong candidates for advanced semiconductor quantum devices. However, the precise mechanism of 'self-assembled' is not understood, which hampers control over QD size, density and distribution for particular applications. Therefore, in situ evaluation technique for observing the growth process is necessary and indispensable. The techniques, RHEED and RDS, which use the electron beam or light, respectively, has already been put to practical use, and these are used widely now. However, even though the atomic level control for Layer by layer growth is enabled, the three dimensions growth cannot be evaluated at atomic-level and real-space by these techniques. Here, STM is good technique to observe the surface in atomic level but it dislikes vibrations and material depositions. To this end, we have developed a new "STMBE" system in which the STM is placed completely inside MBE growth chamber, and with this system, the surface structure is analyzed centering on the in situ STM observation of the InAs QD self-assemble process on GaAs(001). In this talk, I will describe in detail our experimental approach and will present different examples the obtained results for the InAs/GaAs system.

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