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# Raman-Imaging of the Strain-Distribution in Semiconductors

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Background incl. aims
Molecular spectroscopy tools are employed to investigate the vibrational properties of a wide variety of samples. The chemical composition and physical properties of materials are stored in the molecular bonds and can be read from the vibrational spectrum. This poster is dedicated to the influence of a buried stressor on the strain-dependent site control of InGaAs quantum dots. Raman spectroscopy is highly sensitive to subtle changes in the crystal lattice structure. Under strain, its molecular bonds shift slightly, altering the vibrational frequencies of the lattice. The resulting shifts in Raman peaks contain information about the amount and type of strain present.

Methods
The quantum dot sample was analyzed with a Thermo Fisher Scientific DXR3xi Raman imaging microscope and a 532 nm laser. The results are correlated with atomic force microscopy assessments of the sample height profile.

Results
InGaAs quantum dots grow at sites exhibiting a considerably larger strain than their surrounding. Tuning of the buried stressor size results in the precise control of the distribution, emission, and density of the quantum dots. The overlay of Raman strain mappings with atomic force microscopy height profiles allows for a deeper understanding of the physical properties. In combination with computational simulations, the results forecast the design of new devices with distinct emission patterns.

Conclusion
Besides the chemical composition, Raman spectroscopy is powerful in assessing the physical properties such as the strain in semiconductors. The power of spectroscopic techniques is pivotal in the creation, conservation, consolidation, and understanding of materials across all scientific fields.

**Keywords:**

Raman, Spectroscopy, Semiconductor, Strain, AFM

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**Reference:**

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