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PHOTONIK SEMINAR

Dr. Lukas Mennel
Technische Universität Wien

Using nonlinear optics to image strain in 2D semiconductors

Strain engineering is widely used in material science to tune the (opto-) electronic properties of materials and enhance the performance of devices. Two-dimensional atomic crystals are a versatile playground to study the influence of strain, as they can sustain very large deformations without breaking.
We show that optical second harmonic generation constitutes an powerful imaging technique, as it allows extraction of the full strain tensor with a spatial resolution below the optical diffraction limit.
This method is based on the strain-induced modification of the nonlinear susceptibility tensor due to a photoelastic effect. Using a three-point bending technique, we determine the photoelastic tensor elements different TMDs. Once identified, these parameters allow us to spatially image the two-dimensional strain field in inhomogeneously strained samples.
I will start the seminar with a short introduction to two-dimensional materials and nonlinear optics, present experimental results and explain how this effect can be used to image strain fields.

Mennel, L. *et al. Nat. Commun. 9*, 516 (2018)
Mennel, L. *et al. APL Photonics 4*, 034404 (2019)
Mennel, L. *et al. Nano Lett. 20*, 4242 (2020)

Thursday, October 14th, 2021, 14:15h

https://tuwien.zoom.us/j/97611870939?pwd=YW5kaEU5MlBjUk04cjJvRHZDdVBhZz09

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