



INVITATION

for a

VERA - SEMINAR

with

**Toma Susi**

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**Quantifying electron irradiation effects  
for isotope analysis and atom manipulation**

Transmission electron microscopy (TEM) at 60–200 keV primary beam energies can reveal the chemical structure of materials down to the atomic level, but the energetic electrons may also cause irradiation damage. Of the different interaction mechanisms, elastic knock-on damage is understood to be dominant in good conductors such as graphene, whereas complex ionization effects influence damage in other materials [1]. First-principles simulations have been crucial for uncovering atomistic mechanisms and correctly interpreting experimental data. With their aid, atomically resolved imaging has shown that the motion of atoms due to lattice vibrations determines the damage cross section at lower electron energies, which can be used for nanoscale isotope analysis [2]. As a further novel application for focused irradiation in scanning TEM, we have over the past decade demonstrated the manipulation of covalently bound impurity atoms in graphene, single-walled carbon nanotubes, and bulk silicon [3].

[1] T. Susi *et al.*, *Nat. Rev. Phys.* 1 (2019) 397

[2] T. Susi *et al.*, *Nat. Commun.* 7 (2016) 13040

[3] T. Susi, *Chem. Commun.* 58 (2022) 12274

Thursday, 19.03.2026, 16:30 o'clock

**1090 Wien, Währinger Str. 17, "Kavalierstrakt",  
1. Stock, Victor-Franz-Hess Hörsaal**