Session of Focus Materialchemie – Wednesday, **23.10.2024** 16:00 @ Seminarraum Lehar 01 (TU-Wien, Getreidemarkt 9, BC, OG. 01, room A46)
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DekoSchirm: Composite layer for simultaneous el.-mag. shielding and photocatalytic decontamination

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We developed a multifunctional composite coating that provides both electromagnetic interference (EMI) shielding and UV-light-induced surface decontamination. The composite combines nano-graphite with TiO_2 nanoparticles in a polymer matrix, achieving high electrical conductivity alongside photocatalytic self-cleaning.

We present a new way of synthesizing graphene using liquid phase exfoliation (LPE) of graphite, with ammonia (NH_3) as an easily removable additive, producing stable, high-concentration graphene suspensions without hazardous chemicals or complex purification.

Following the synthesis of graphene, we formulated electrically conductive nanocomposites using solution blending of graphite, graphene and graphene nanoplatelets (GNPs) with polymers like PMMA and PS. These composites, applied as inks and dried at room temperature, yielded conductive films without further processing. We identified the optimal filler loadings to balance conductivity and mechanical strength, demonstrating scalability by successfully spray-coating a large surface area.

Finally, we introduced TiO_2 as a photocatalyst to enable self-decontaminating properties. A graphene-based material was selected for conductivity and easy functionalization with TiO_2. The composite showed effective EMI shielding and was capable of photocatalytically degrading model organic substances, demonstrating its potential for real-world protective coatings.