

# nanoSeminar Series 2021

Institute for Materials Science

**Prof. Dr. Hâldun Sevinçli**

Department of Materials Science and Engineering, Institute  
of Technology, İzmir

**“Charge transport in multilayer graphene oxide”**

Thursday, July 8<sup>th</sup> 2021  
13:00 – 14:00

Normal: Seminar Room 115, Hallwachsstr. 3 (HAL)

Pandemic version: <https://tinyurl.com/nanoSeminar-GA>

Charge transport across two-dimensional systems has been widely investigated during the last decade. Still, there are a lot of unexplored features in transport across multilayer disordered systems. Motivated by recent experiments [1], we simulate transport across multilayer structures. We observe that conductance decreases when we deposit additional layers over a clean graphene monolayer. However, in defective graphene oxide the trend is opposite. Moreover, dependence on the number of layers is an unanswered question. Starting with Landauer-Büttiker and Kubo-Greenwood methodologies, we are able to shed light to the experimental results. Using localization theory and Thouless relation, we derive a scaling relation for dependence on the number of layers and obtain a good agreement with experiment.

[1] Alessandro Kovtun, Andrea Candini, Anna Vianelli, Alex Boschi, Simone Dell’Elce, Marco Gobbi, Kyung Ho Kim, Samuel Lara Avila, Paolo Samorì, Marco Affronte, Andrea Liscio, and Vincenzo Palermo,

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Hâldun Sevinçli is a faculty member at the Department of Materials Science and Engineering of İzmir Institute of Technology.

He graduated from the Physics Department of Middle East Technical University, where he also received his MSc degree. He finished his PhD at the Physics Department of Bilkent University in 2008 with his studies on theoretical and computational solid state physics. After working at the Materials Science Institute of Dresden Technical University between 2008-2012 as a postdoctoral researcher in several projects, he moved to the Micro- and Nano-technology Department of the Technical University of Denmark. He joined İzmir Institute of Technology in 2013. His research is on theoretical and computational condensed matter physics with focus on molecular junctions, carbon nanotubes, graphene and related two-dimensional materials, their electrical, magnetic, thermal properties and quantum transport. The major topics in his studies are quantum thermal transport and phononics; quantum transport in disordered and nano-structured systems; thermoelectrics; magnetic properties in low-dimensional systems and spintronics; order-N quantum transport methodologies.

Hâldun Sevinçli received BAGEP Young Scientist Prize of Bilim Akademisi (Science Academy-Turkey) in 2014, and Sedat Simavi Science Award in 2017.