Saban Mustafa Hus

Postdoctoral Research Associate
Scanning Probe Microscopy Group
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Education

The University of Tennessee, Knoxville

Ph.D. in Physics ***2014***

Emphasis in experimental condensed matter physics and dissertation research focused on

- Growth and structural characterization of epitaxial nanowires on silicon
- Electron transport in nanoscale structures

Middle East Technical University (Ankara / TURKEY)

M.Sc. in Physics ***2006***

Coursework and thesis research focused on

- Semiconductor device manufacturing, thin film deposition, ion implantation
- Structural and opto-electronic properties of II-VI thin films and nanocrystals

B.Sc. in Physics ***2004***

Coursework focused on condensed matter physics, optical and structural properties of thin films

B.Sc. in Electrical and Electronics Engineering ***2003***

Coursework focused on software development, computer architecture, solid state devices and VLSI design

Work and Research Experience

Oak Ridge National Laboratory

Postdoctoral Research Associate ***2014- Present***

- Studied electron transport in nanowires and other low dimensional systems using a cryogenic four-probe scanning tunneling microscope (4P-STM).
- Developing a four-probe spectroscopy method to distinguish surface and bulk conductivities in topological insulator materials.
- Developing experimental methods for 4P-STM to detect spin polarized electron transport on the surfaces of topological insulator materials.

The University of Tennessee, Knoxville

Research Assistant ***2008- 2014***

- Led and conducted a research project investigating the structural and electronic properties of ultra-thin YSi_2 nanowires with cryogenically cooled STM and RHEED.
- Developed in-situ metal contact deposition methods for connecting metal-silicide nanowires to mesoscopic structures for transport measurements. Investigated these structures with STM and SEM. Performed in-situ electron transport measurements in these systems.
- Performed preliminary experiments investigating quantum size effects in collective excitations in ultra-thin Mg films and hydrogen storage capability of these films.
- Designed and implemented ultra-high vacuum (UHV) chambers and components for thin film deposition and in-situ sample characterization.
- Actively involved in purchasing, maintenance and repair of many UHV systems.
- Collaborated in large (7 person) team in designing layout of new UHV lab.
- Peer reviewed papers for Phys. Rev. Lett., Phys. Rev. B, J. Phys. :Condens. Matter, Applied Surface Science, in part joined with P.C. Snijders and H. H. Weitering.

Middle East Technical University (Ankara / TURKEY)

Research Assistant ***2004- 2007***

- Grown and analyzed the structural, opto-electronic properties of II-VI thin films. Investigated the effects of ion implantation on these properties.
- Automated several experimental procedures. Developed software in C++ and LabView to reduce measurement times up to 90% while increasing the accuracy and reliability.

Journal Articles

- Contactless Determination of Electrical Conductivity of One-Dimensional Nanomaterials by Solution-Based Electro-orientation Spectroscopy, C. Akin, J. Yi, L.C. Feldman, C. Durand, **S. M. Hus**, A.P. Li, M.A. Filler, J.W. Shan, *ACS Nano.* **9**, 5405 (2015)
- Quantum oscillations in the surface excitations of ultrathin Mg(0001) films, A. Teng, K. Kempa, M. M. Ozer, **S. M. Hus**, P.C. Snijders, G. Lee, H. H. Weitering, *Physical Review B* **90**, 115416 (2014).
- Formation of uni-directional ultrathin metallic YSi_2 nanowires on Si(110), **S. M. Hus** and H.H. Weitering, *Appl. Phys. Lett.* **103**, 073101 (2013)
- Structure and growth of quasi-one-dimensional YSi_2 nanophases on Si(100), V. Iancu, P. R. C. Kent, **S. M. Hus**, H. Hu, C.G. Zeng, H.H. Weitering, *J. Phys.: Condens. Matter* **25** 014011 (2013)
- Electrical, photo-electrical, optical and structural properties of CdSe thin films deposited by thermal and e-beam techniques**, S. M. Hus** and M. Parlak, *J. Phys. D: Appl. Phys*. **41** 035405 (2008)

Conference Presentations/Papers

- Differentiation of surface and bulk conductivities in topological insulator via four-probe spectroscopy, A.P Li, C Durand, **S. Hus**, X. Zhang, M. McGuire, Y.Chen, *American Physical Society, APS March Meeting 2016*
- Direct Measurement of Conductance from Topological Surface States in Topological Insulators, C. Durand, X. Zhang, **S. M. Hus**, M. Mcguire, I. Vlassiouk, A.P. Li, *AVS 62nd International Symposium & Exhibition, 2015*
- Contactless, high-throughput determination of electrical conductivity of one-dimensional nanomaterials by solution-based electro-orientation spectroscopy, C. Akin, J. Yi, L.C. Feldman, J.W. Shan, C. Durand, **S. M. Hus**, A.P. Li, M.A. Filler, *68th Annual Meeting of the APS Division of Fluid Dynamics, 2015*
- Epitaxial growth of YSi2 nanowires the on Si(110) surface, **S. M. Hus**, H. H. Weitering, *American Physical Society, APS March Meeting 2013*
- Surface Electronic Excitations of Quantum Confined Mg Films on Si(111), A. Teng, K. Kempa, X. Li, M. Ozer, **S. Hus**, P. Snijders, G. Lee, H. Weitering, *American Physical Society, APS March Meeting 2013*
- Ultrathin YSi_2 nanowires for electrical readout of DNA , **S. M. Hus**, H. Hu, V. Iancu, A.P Li, L. Menard, M. W. Woodson, M. Ramsey, H. H. Weitering, *NHGRI Sequencing Technology Meeting 2011*
- Transport studies of ultrathin YSi2 nanowires, **S. M. Hus**, H. Hu, V. Iancu, H. H. Weitering, A.P Li, *American Physical Society, APS March Meeting 2011*
- Surface plasmon excitation in ultrathin Mg films on Si(111), A. Teng, G. Lee, **S. Hus**, H. Weitering, *American Physical Society, APS March Meeting 2011*

Submitted Journal/ Conference Papers

- Differentiation of surface and bulk conductivities in topological insulator via four-probe spectroscopy, C. Durand, X. Zhang, **S. M. Hus**, C. Ma, M. Mcguire, Y, Xu, H. Cao, I. Vlassiouk, Y. Chen, A.P Li *Submitted to Nano Letters*

- Differentiation of surface and bulk conductivities via four-probe spectroscopy, **S. M. Hus**, C. Durand, X. Zhang, , C. Ma, M. Mcguire, Y, Xu, H. Cao, I. Vlassiouk, Y. Chen, A.P Li *Submitted to Microscopy and Microanalysis 2016 Meeting*
- Contactless, high-throughput determination of electrical conductivity of one-dimensional nanomaterials by solution-based electro-orientation spectroscopy, C. Akin, J. Yi, L.C. Feldman, C. Durand, **S. M. Hus**, A.P. Li, H. Y. Hui, M.A. Filler, J.W. Shan, *Submitted to Royal Society of Chemistry Lab on a Chip*

Relevant Experimental Skills

- STM
- Four-probe STM
- Cryogenics
- RHEED
- HREELS
- SEM
- XRD
- Electron transport in nanoscale
- Scanning Probe Potentiometry (STP)
- UHV (design and Maintenance)
- Metal-Semiconductor Epitaxy
- Lithography
- Programming Languages: C++, Labview
- Transport and Photoconductivity in Thin Films

Other Work and Teaching Experience

- Designed and tested electronic circuits for intelligent power distribution networks during summer internships (2001-2002).
- Teaching assistant, Middle East Technical University (Ankara/Turkey):
  - Coauthored a computer aided freshmen physics laboratory manual.
  - Taught freshmen level physics laboratory courses. Tutored several physics courses from freshmen to graduate level.
- Physics Teacher, TED College (Ankara/Turkey).
- Teaching assistant, The University of Tennessee, Knoxville
  - Taught introductory level physics laboratory courses.
  - Worked as a tutor for freshmen and sophomore level physics courses.
  - Graded homework for senior and graduate level physics courses.
- Supervised Sören Richard Lindemann (a visiting graduate student) during his studies at UTK.

References

- Dr. Hanno H. Weitering

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- Dr. Paul Snijders

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- Dr. An-Ping Li

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- Dr. Geun Seop Lee

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