Dr. SABRI ALKIS

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Education

Doctor of Philosophy (Ph.D.) in Chemistry 2004-2009
University of Florida
Bachelor of Science (B.Sc.) in Chemistry 1999-2004
Bilkent University

Fields of Interest

Optoelectronic devices: Design, simulation, fabrication and characterization of optoelectronic devices, particulary thin film photodetectors and memory cells, LED measurements, nanotechnology based (nano-molecular electronics) devices.
Nanophotonics: Investigating light-matter interactions at the nanoscale, improving the performance of optoelectronic devices using plasmonics.
MEMS & NEMS: Fabrication of ZnO, graphene, nanotechnology based pressure transducers and membrane production for efficient aero-acoustics applications.
Nanomaterial synthesis: Synthesis, and characterization of nanomaterials including Silicon, Silicon/Germanium, Molybdenum disulfide, Indium nitride nanocrystals.
SEM & Focused Ion Beam studies: Studies of defects in semiconductor structures and multi-quantum wells.
Computational nanotechnology: Simulations of nanomaterials and nano-molecular electronics devices.

Experience in Fabrication &Characterization Equipments

Patterning: Optical lithography (EVG 620).
Deposition: Plasma Enhanced Chemical Vapor Deposition (PECVD), Thermal & E-beam Evaporation, Atomic Layer Deposition, RF & DC magnetron sputtering.
Etching: Wet bench, dry (DRIE) etching (BOSCH) processes, Asher.
Electrical measurement: Probe Station (Keithley 4200-SCS) and Semiconductor Parameter Analyzer.
Optical Characterization: UV/VIS/NIR spectrophotometer, Fluorescence spectrophotometer, Raman spectrophotometer, FTIR, Zetasizer.
Optoelectronic device characterization setups: Photoresponsivity measurement setup (150 W Xe lamp, monochromator, lock-in amplifier), photovoltaic characterization setup (solar simulator, parameter analyzer)
Engineering Softwares: Labview, Matlab, Origin, Excell, Fortran, Java, Layout Editor.
Modelling Softwares: DLPOLY, VASP, Gaussian 03, Molekel, Hyperchem.

Journal Publications (in chronological order)

1. Sabri Alkis, Ping Jiang, Lin-Lin Wang, Adrian E. Roitberg, Hai-Ping Cheng, Jeffrey L. Krause, "Molecular dynamic simulations of alkanethiol monolayers with azobenzene molecules on the Au(111) surface," ***Journal of Physical Chemistry C***, 111 (40), 14743-14752, (2007).

2. Sabri Alkis, Hai-Ping Cheng, James Fry and Jeffrey Krause, "Dynamics of Ag clusters on complex surfaces", ***Physical Review B,*** **Rapid Communication**,79, 121402R, (2009).

3. Sabri Alkis, Ping Jiang, Lin-Lin Wang, Adrian E. Roitberg, Hai-Ping Cheng and Jeffrey L. Krause, "Molecular dynamics simulations of Au penetration through alkanethiol molecules on the Au(111) surface, ***Journal of Physical Chemistry*** **C**, 113, 6360-6366 (2009), illustrated on cover page, ***Department of Energy Basic Energy Sciences*** workshop, February 9-10 (2010).

4. Luis Agapito, Sabri Alkis, Hai-Ping Cheng, Jeffrey L. Krause, "Atomistic origins of molecular memristors", ***Journal of the Physical Chemistry C***, 113 (48), (2009).

5. Sabri Alkis, Ali Kemal Okyay, "Silicon nano-particles with high resistance to harsh ambient conditions", ***Journal of Cluster Science***, Vol.23, pp. 967-974, (2012). DOI: 10.1007/s10876-012-0473-z.

6. Sabri Alkis, Mohammad Ghaffari, Ali Kemal Okyay, "Synthesis of ultra-small Si/Ge nanoparticles using electrochemistry", ***Materials Chemistry and Physics***, Vol. 134, pp. 616-622, (2012). DOI: 10.1016/j.matchemphys.2012.03.040.

7. Sabri Alkis, Bülend Ortac, Ali Kemal Okyay, "Blue luminescent Silicon nano crystal generation by ultra-short laser ablation in liquid", ***Journal of Physical Chemistry C***, Vol.116, pp. 3432-3436, (2012). DOI: 10.1021/jp211521k.

8. Sabri Alkis, Mustafa Alevli, Salamat Burzhuev, Huseyin Avni Vural, Ali Kemal Okyay, Bulend Ortaç, "Generation of InN Nanocrystals in Organic Solution Through Laser Ablation of HPCVD grown InN Thin Film", ***Journal of Nanoparticle Research***, Vol.14, pp.1048, (2012). DOI: 10.1007/s11051-012-1048-5.

9. Sabri Alkis, Tugba Oztas, Levent Erdal Aygun, Bülend Ortaç, Feyza Bozkurt, Ali Kemal Okyay, "Thin film MoS_2 nanocrystal based ultraviolet photodetector", ***Optics Express***, Vol. 20, no:19, pp. 21815-21820, (2012).

10. Sabri Alkis, Feyza Bozkurt, Bülend Ortaç, Ali Cahit Koşger, Ali Kemal Okyay, "Plasmonic enhanced photodetector based on Silicon Nanocrystals obtained through laser ablation", ***Journal of Optics***, Vol.14, pp.125001, (2012). ***NATURE PHOTONICS research highlights,*** Vol.7, pp. 2, (2013).

11. Sabri Alkis, Burak Tekcan, Ammar Neyfeh, Ali Kemal Okyay, "UV/VIS range photodetectors based on thin film ALD grown ZnO (n)/Si(p) heterojunction diodes", ***Journal of Optics,*** DOI: JOPT/471935.

12. Nazek-el Atab, Furkan Çimen, Sabri Alkis, Ali K. Okyay, Ammar Nayfeh, "Enhanced memory effect with embedded graphene nanoplatelets in ZnO charge trapping layer", ***Applied Physics Letters***, vol. 105, 033102, (2014).

13. Nazek-el Atab, Ayşe Özcan, Sabri Alkis, Ali K. Okyay, Ammar Nayfeh, "Low power zinc-oxide based charge trapping memory with embedded silicon nanoparticles via poole-frenkel hole emission", ***Applied Physics Letters***, vol. 104, 013112, (2014).

14. Nazek-el Atab, Furkan Çimen, Sabri Alkis, Bülend Ortaç, Mustafa Alevli, Nikolaus Dietz, Ali K. Okyay, Ammar Nayfeh, "Enhanced memory effect via quantum confinement in 16 nm InN nanoparticles embedded in ZnO charge trapping layer", ***Applied Physics Letters***, vol. 104, 253106, (2014).

15. Nazek-el Atab, Ayşe Özcan, Sabri Alkis, Ali K. Okyay, Ammar Nayfeh, "Silicon nanoparticle charge trapping memory cell", ***Physica Status Solidi C (RRL),*** vol. 8, 629-633, (2014).

16. Burak Tekcan, Sabri Alkis, Mustafa Alevli, Nikolaus Dietz, Bülend Ortaç, Necmi Biyikli, Ali K. Okyay, "A near infrared range photodetector based on indium nitride nanocrystals obtained through laser ablation", ***IEEE Electron Device Letters***, DOI:10.1109/LED.2014.23367.95

17. Ju Hyung Nam, Sabri Alkis, Donguk Nam, Farzaneh Afshinmanesh, Jaewoo Shim, Jin-Hong Park, Mark Brongersma, Ali Kemal Okyay, Theodore I. Kamins, Krishna Saraswat, **"**Lateral overgrowth of

germanium for monolithic integration of germanium-on-insulator on silicon", ***Journal of Crystal Growth***, DOI: 10.1016/j.jcrysgro.2014.11.004

18. Nazek el Atab, Sabri Alkis, Burak Tekcan, Ali Kemal Okyay, Ammar Nayfeh, "Memory charging effect of ultrasmall 2 nm laser synthesized solution processable Si nanoparticles embedded in $Si/Al_2O_3/SiO_2$ structure", ***Physica Status Solidi A: Applications and Materials Science***, (2015).

Conference Talks

1. Seminar "Motion of clusters on complex surfaces," American Physical Society (APS), March Meeting, Denver, Colorado, U.S.A, March 8, 2007.

2. Seminar "Controlling Au penetration through alkanethiol monolayers on the Au(111) surface", American Physical Society (APS), March Meeting, New Orleans, Louisiana, U.S.A, March 11, 2008.

3. Seminar "Conductance switching in organic monolayers", American Physical Society (APS), March Meeting, Pittsburg, Pennsylvania, U.S.A, March 10, 2009.

4. Seminar "The effect of Silicon nano-particles on commercial light emitting diodes (LED) power performances", Nano-TR, Istanbul, TURKEY, June 30, 2011.

5. Seminar, "A near-infrared photodetector based on indium nitride nanocrystals obtained through laser ablation", Nano-TR, Istanbul, TURKEY, 17-21 June, 2014.

6. Seminar, "Enhanced Retention Characteristic of MOS Charge Trapping Memory with InN Nanoparticles Embedded in ZnO Charge Trapping Layer", Materials Research Society (MRS) 2014 Fall Meeting and Exhibit, 28 November-6 December, BOSTON, U.S.A, 2014.

Awards & Honors

The Scientific and Technological Research Council of Turkey (Tubitak-BİDEB) post-doctoral research fellow (2010-2012).

Bilkent University Board of Trustees Scholarship awarded for undergraduate study (1999-2004).

Research & Teaching Experience

Project engineer in Dr. Okyay Research Group **2014-present**
Bilkent University Electrical Engineering Department, Ankara, TURKEY
Micro and nanofabrication (ZnO, graphene and nanotechnology based pressure MEMS/NEMS transducers, Si/Ge multi-quantum well architectures), dry etching (BOSCH processes), membrane production and electrical measurements.

Post-doctoral researcher in Dr. Okyay Research Group **2010-2014**
Bilkent University Electrical Engineering Department, Ankara, TURKEY
Nanofabrication (UV/VIS and NIR range thin film photodetectors, thin film memory devices based on semiconductor nanocrystals), semiconductor nanomaterial synthesis, spectroscopy and nanophotonics applications (LED performance applications), clean room technologies (metallization, chemical vapor deposition, photolithography, etching, electrical measurements).

Research Assistant in Dr. Krause Research Group **2004-2009**

Florida University Chemistry Department, Gainesville, FL
Computational nanotechnology, nano-molecular electronics, simulations of molecular switches and self assembled monolayers, memristor devices, quantum transport.

Student Assistant in Dr. Cölfen Research Group **Summer 2003**
Maxx Planck Institute of Colloids and Interfaces, Potsdam, Germany
Analytical Ultracentrifuge (AUC) detector development, Labview programming.

Teaching Assistant
Florida University Chemistry Department
Chem 101: General Chemistry *Fall & Spring 2004*

Related Course Work

Graduate level courses:
Chemical Thermodynamics
Molecular Bonding and Spectra
Computational Chemistry
Physical Modelling and Simulation
Special Topics in Physical Chemistry (EPR spectroscopy)
Introduction to Spectroscopy

Membership

American Physical Society (APS) *2010-present*

References

Dr. Jeff Krause, program officer, Department of Energy (DOE), Optical Sciences Program, Washington, USA
e-mail: Jeff.Krause@science.doe.gov

Dr. Ali Kemal Okyay, Assistant professor, Bilkent University Electrical Engineering Department, Ankara, TURKEY
e-mail: aokyay@ee.bilkent.edu.tr

Dr. Ammar Nayfeh, Assistant professor, Masdar Institute Microsystems Enginnering, Abu Dhabi, United Arab Emirates.
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Dr. Hai-Ping Cheng, professor, Department of Physics, Florida University, Gainesville, Florida, USA
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