KATAYUN (KATY) BARMAK

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EDUCATION

Ph.D., Materials Science, Massachusetts Institute of Technology, 1989
M.A., University of Cambridge, England, 1987
S.M., Metallurgy, Massachusetts Institute of Technology, 1985
B.A., Materials Science, 1st Class Honours, University of Cambridge, England, 1983

PROFESSIONAL EXPERIENCE

2013-19	Director, Materials Science and Engineering Program, Department of Applied Physics and Applied Mathematics, Columbia University
2011-	Philips Electronics Professor of Applied Physics and Applied Mathematics and Materials Science and Engineering, Columbia University
2002-11	Full Professor with indefinite tenure, Carnegie Mellon University
1999-02	Associate Professor with indefinite tenure, Carnegie Mellon University
1998-03	Visiting Scientist, IBM T.J. Watson Research Center
1997-98	Associate Professor with indefinite tenure, Lehigh University
1995-98	Co-director, Thin Film Laboratory, Materials Research Center, Lehigh
1992-93	Harold Chambers Junior Faculty Chair of Materials Sci. and Eng., Lehigh
1992-97	Assistant Professor, Lehigh University
1989-92	Staff Engineer, Advanced Device Development, IBM T. J. Watson Research Center and IBM East Fishkill, New York.

R&D of materials, processes and structures for advanced generations of bipolar junction and field effect transistors

HONORS AND AWARDS

2023	Fellow, ASM International Citation: *"For seminal contributions to the study of solid-state reactions, phase transformations, microstructure evolution and structure-property relations in metallic films for electronic and magnetic applications."*
2019	IEEE Senior Member
2004	IBM Materials Research Community Visiting Scientist, IBM T. J. Watson Research Center (one of only two faculty awards made worldwide)
1998-03	Visiting Scientist, IBM T.J. Watson Research Center
2001	NSF Creativity Award

1999 IBM Faculty Fellowship Award
1994 National Young Investigator (NYI) Award, National Science Foundation
1994 Deutsche Forschungsgemeinschaft Fellowship Award
1986-89 AT&T Foundation Fellowship Award

UNIVERSITY AWARDS

2017 Edward and Carole Kim Faculty Involvement Award, School of Engineering, Columbia University
To honor a faculty member who is not only an excellent teacher, but who also shows a special, personal commitment to students.

2009 Philbrook Prize in Engineering, Carnegie Mellon University
Awarded for substantial, sustained contributions to excellence in education, or to the application of materials science to important problems.

1995 Alfred Noble Robinson Award, Lehigh University
Awarded for outstanding performance in the service of the university and unusual promise of professional achievement. One given per year.

1992 Chambers Junior Professorship, Lehigh University
An endowed professorship conferred by Lehigh University. One given per year.

PROFESSIONAL SOCIETY BOARD

1998-00 Materials Research Society Council (Equivalent to Board of Directors)

MEMBERSHIP OF PROFESSIONAL SOCIETIES

ASM International (ASM), The Minerals, Metals, Materials Society (TMS); Materials Research Society (MRS); Microscopy Society of America (MSA); Microbeam Analysis Society (MAS); American Physical Society (APS), American Vacuum Society (AVS), Society for Industrial and Applied Mathematics (SIAM), Electrochemical Society (ECS), IEEE, American Association for the Advancement of Science (AAAS), Sigma Xi.

EDITORSHIP, EDITORIAL BOARD, EDITORIAL COMITTEE

2024-27 Editorial Oversight Committee, Journal of Electronic Materials
2017-19 Member of Editorial Board of Journal Magnetism and Magnetic Materials
2010-13 International Materials Reviews Committee
Jointly published by ASM International and the Institute of Materials, Minerals and Mining (UK), *International Materials Reviews* covers technologies affecting the metals, structural ceramics, composite materials and electronic materials industries. Topics range from actual usage to theory and practice of extraction, production, fabrication, properties and behavior of materials
2007-13 Associate Editor, Journal of Electronic Materials (a TMS Society Publication)

CONFERENCE ORGANIZATION

2016 Meeting co-Chair, 13th Joint Magnetism and Magnetic Materials and Intermag Conference, San Diego, CA, 2016
Atsufumi Hirohata, co-Chair; Bruce Gurney, General Chair

1999 Meeting Chair, Materials Research Society Conference, San Francisco, CA, 1999
James S. Speck, Raymond T. Tung, Paul D. Calvert, co-Chairs

SYMPOSIA ORGANIZATION

2020 Polycrystalline Microstructures: Recent Advances and New Trends
Society of Industrial and Applied Mathematics (SIAM) Math and Materials Conference Bilbao, Spain, 2020. Conference held online May 17-28, 2021 as a result of the COVID-19 pandemic.
Katayun Barmak, Yekaterina Epshteyn (Dept. Mathematics, Univ. Utah), Co-Organizers

2020 Recent Developments in Polycrystalline Microstructures
Joint conference of the World Congress on Computational Mechanics and European Community on computational methods in Applied Sciences (WCCM-ECOMAS) Paris, France, 2020, Conference held online Jan. 11-15, 2021 as a result of the COVID-19 pandemic.
Katayun Barmak, Yekaterina Epshteyn (Dept. Mathematics, Univ. Utah), Co-Organizers

1997 Materials Research Society Symposium M: Magnetic Ultrathin Films, Multilayers and Surfaces, San Francisco, CA
Katayun. Barmak, David Chambliss, David Kubinski, Peter. Dederichs, Wim de Jonge, Toshikazu Katayama, Alain Schuhl, James Tobin, Co-Organizers

1994 Materials Research Society Symposium H: Polycrystalline Thin Films: Structure, Texture, Properties and Applications, San Francisco, CA
Katayun. Barmak, Michael. A. Parker, Jerrold. A. Floro, Robert. Sinclair, David. A. Smith, Co-Organizers

CONFERENCE ORGANIZATION COMMITTEES

2020 Organizing Committee Member, SIAM Math and Materials Conference
2014 Program Committee Member, Magnetism and Magnetic Materials Conference
2013 Program Committee Member, Magnetism and Magnetic Materials Conference
2011 Program Committee Member, Magnetism and Magnetic Materials Conference
2008 Program Committee Member, Magnetism and Magnetic Materials Conference
2007 Program Committee Member, Magnetism and Magnetic Materials Conference
2006 Program Committee Member, 10th Joint Magnetism and Magnetic Materials and Intermag Conference
2005 Program Committee Member, 50th Annual Conference on Magnetism and Magnetic Materials
1994-99 International Advisory Committee Member for Functionally Graded Materials

PROFESSIONAL SOCIETY COMMITTEES

2024-26 Fellows Selection Committee, ASM
2023-25 Gold Medal Award Selection Committee, ASM
2023-25 Sauveur Award Selection Committee, ASM
2023-24 Vice Chair, Executive Committee, ASM NY-NJ Chapter
2022-23 Member, Executive Committee, ASM NY-NJ Chapter
2014-17 Elected Member, IEEE Magnetics Administrative Committee (AdCom)
AdCom is responsible for the operations of the Society. It provides administrative support for those who directly manage Society activities.
2011-13 Non-voting Member, IEEE Magnetics Administrative Committee (AdCom)
2011-13 Member, IEEE Magnetics Society and the society representative to Women in Engineering (WIE) Committee.
WIE is a committee of the IEEE Board of Directors
2003-05 Member, Graduate Student Award Subcommittee of the Awards Committee, Materials Research Society
2001 Member, Nominations Committee, Materials Research Society
1998-00 Member, Student Affairs Committee, The Minerals, Metals, Materials Society
1996-98 Chair, Membership Committee, Materials Research Society
1994-95 Chair, Promotion and Retention Subcommittee of the Membership Committee, Materials Research Society

RESEARCH INTERESTS

Synthesis, processing, properties, crystal structure, grain structure, and texture of metallic films for electronic and magnetic applications; thermodynamics and kinetics of solid state reactions and phase transformations in nanostructured films. Grain boundaries, grain growth and microstructural evolution. Synthesis, characterization and defect computations of transition metal dichalcogenides for electronic, photonic and optoelectronic applications. Characterization techniques of interest include differential scanning calorimetry (DSC), X-ray and electron diffraction (XRD, ED), X-ray reflectivity, electron microscopy (SEM, TEM, S/TEM) and crystal orientation mapping.

PATENTS, PROVISIONAL PATENTS and DISCLOSURES

5. **U.S. Patent 11,410,931 –** Crystallographic Orientations of Ru Films
Inventors: Coffey, Kevin R., Dein, Edward, Ezzat, Sameer, Mani, Prabhu Das, Barmak, Katayun

4. **U.S. Patent 10,332,661 –** Rare Earth-Free Permanent Magnetic Material
Inventors: Barmak, Katayun, Lewis, Laura H.

3. **U.S. Patent 9,117,821 –** Oriented Crystal Nanowire Interconnects
Inventors: Barmak, Katayun, Choi, Dooho, Coffey, Kevin R.

2. **US Patent 9,076,476** – Thin-Film Media Structures for Perpendicular Magnetic Recording

and Storage Devices Made Herewith
Inventors: Granz, Steven D., Barmak, Katayun, Kryder, Mark H.

1. **US Patent 6,846,734** – Method and process to make multiple-threshold metal gates CMOS technology
Inventors: Amos, Ricky; Barmak, Katayun; Boyd, Diane C.; Cabral, Jr., Cyril; Leong, Meikei; Kanarsky, Thomas S.; Kedzierski, Jakub Tadeusz

BOOKS and BOOK CHAPTERS

6. Metallic Films for Electronic, Magnetic, Optical and Thermal Applications: Structure, Processing and Properties, eds. K. Barmak, K. R. Coffey, Woodhead Publishing Ltd. (now Elsevier), 2014.
ISBN 978-0-85709-057-7 (print)
ISBN 978-0-85709-629-6 (online)

- 3 Chapters by Barmak
  - Crystal Orientation Mapping in Scanning and Transmission Electron Microscopes
  - Post-Deposition Grain Growth in Metallic Films
  - Disorder-order Transformations in Metallic Films

5. Orientation Mapping, A. D. Rollett and K. Barmak, Chapter in Physical Metallurgy, eds. D. Laughlin, K. Hono, Elsevier, 2014. Print Book ISBN: 9780444537706, eBook ISBN: 9780444537713

4. Hollow-cone dark-field transmission electron microscopy for grain size and dislocation-density quantification of nanocrystalline materials, B. Yao, H. Heinrich, K. Barmak, K. R. Coffey, Kyu Cho, and Y.H. Sohn, in "Microscopy: Science, Technology, Applications and Education, A. Méndez-Vilas, and J. Díaz (Eds), , (Formatex Research Center, Badajos, Spain, 2010). Vol. 2, pp. 1319-1326. ISBN (13): 978-84-614-6190-5

3. J. M. Rickman, K. Barmak, "Microstructural characterization associated with solid-solid transformations", Handbook of Materials Modeling, Springer, Netherlands, 2391-2402 (2005).

2. Magnetic Ultrathin Films, Multilayers and Surfaces - 1997, eds. J. Tobin, D. Chambliss, D. Kubinski, K. Barmak, P. Dederichs, W. de Jonge, T. Katayama, A. Schuhl, Materials Research Society Symposium Proceedings **475** (1997) pp. 1-622.

1. Polycrystalline Thin Films: Structure, Texture, Properties and Applications, eds. K. Barmak, M. A. Parker, J. A. Floro, R. Sinclair, D. A. Smith, Materials Research Society Symposium Proceedings **343** (1994) pp. 1-772.

PUBLICATIONS IN ARCHIVAL JOURNALS

193. Taketo Handa, Madisen A. Holbrook, Nicholas Olsen, Luke N. Holtzman, Lucas Huber, Hai I. Wang, Mischa Bonn, Katayun Barmak, James C. Hone, Abhay N. Pasupathy, X.-Y. Zhu, "Spontaneous exciton dissociation in transition metal dichalcogenide monolayers", Science Advances **10**, (2024).
DOI: 10.1126/sciadv.adj4060

192. Jeffrey M. Rickman, Katayun Barmak, Brian J. Chen, Matthew J. Patrick, "Evolving information complexity of coarsening materials microstructures", Scientific Reports, 13:22390 (2023).
DOI: 10.1038/s41598-023-49759-x

191. Matthew Patrick, James K. Eckstein, Javier R. Lopez, Silvia Toderas, Stacey Levine, Jeffrey M. Rickman, Katayun Barmak, "Automated Grain Boundary Detection for Bright-Field Transmission Electron Microscopy Images via U-Net", Microscopy and Microanalysis **29**, 1968-1979 (2023).
DOI: 10.1093/micmic/ozad115

190. Kaikui Xu, Madisen Holbrook, Luke Holtzman, Abhay Pasupathy, Katayun Barmak, James Hone, Matthew Rosenberger, "Validating the use of conductive atomic force microscopy for defect quantification in 2D materials", ACS Nano **17**, 24743-24752 (2023).
DOI: 10.1021/acsnano.3c05056

189. Shan-Wen Cheng, Ding Xu, Haowen Su, James M Baxter, Luke N Holtzman, Kenji Watanabe, Takashi Taniguchi, James C Hone, Katayun Barmak, Milan Delor, "Optical imaging of ultrafast phonon-polariton propagation through an excitonic sensor", Nano Letters **23**, 9936-9942 (2023).
DOI: 10.1021/acs.nanolett.3c02897

188. Song Liu, Yang Liu, Luke Holtzman, Baichang Li, Madisen Holbrook, Jordan Pack, Takashi Taniguchi, Kenji Watanabe, Cory R. Dean, Abhay N. Pasupathy, Katayun Barmak, Daniel A. Rhodes, and James Hone, "Two-step flux synthesis of ultrapure transition-metal dichalcogenides", ACS Nano **17**, 16587-16596 (2023)
DOI: 10.1021/acsnano.3c02511

187. J. M. Rickman, K. Barmak, Y. Sun, G. Zangari, "Correlation function analysis of electrodeposition kinetics and evolving microstructure", Electrochim. Acta **261**, 142663 (2023).
DOI: 10.1016/j.electacta.2023.142663

186. J. M. Rickman, K. Barmak, Y. Epshteyn, C. Liu, "Point process microstructural model of metallic thin films with implications for coarsening", Nature Computational Materials **9**, 27 (2023).
DOI: 10.1038/s41524-023-00986-w

185. Matthew J. Patrick, Gregory S. Rohrer, Ooraphan Chirayutthanasak, Sutach Ratanaphan, Eric R. Homer, Gus L. W. Hart, Yekaterina Epshteyn, Katayun Barmak, "Relative grain boundary energies from triple junction geometry: limitations to assuming the Herring condition in nanocrystalline thin films", Acta Mater. **242**, 118746 (2023).
DOI: 10.1016/j.actamat.2022.118476

184. Maxwell A. L'Etoile, Baoming Wang, Quintin Cumston, Andrew P. Warren, James C. Ginn, Katayun Barmak, Kevin R. Coffey, W. Craig Carter, and Carl V. Thompson, "Experimental and computational study of the orientation dependence of single-crystal ruthenium nanowire stability", Nano Letters, **22** ,9958-9963 (2022).
DOI: 10.1021/acs.nanolett.2c03529

183. Yi-Hsun Chen, Kaijian Xing, Song Liu, Luke N. Holtzman, Daniel L. Creedon, Jeffrey C. McCallum, Kenji Watanabe, Takashi Taniguchi, Katayun Barmak, James Hone, Alexander R. Hamilton, Shao-Yu Chen, and Michael S. Fuhrer, "P-Type ohmic contact to monolayer WSe_2 field-effect transistors using high-electron affinity amorphous MoO_3, ACS Applied Electronics **4**, 5379-5386(2022).
DOI: 10.1021/acsaelm.2c01053

1812. ***(Invited)*** Katayun Barmak, Anastasia Dunca, Yekaterina Epshteyn, Chun Liu and Masashi Mizuno, "Grain growth and the effect of different time scales", M. I. Español et al. (eds.), Research in Mathematics of Materials Science, Association for Women in Mathematics Series **31**, Springer, pp. 33-58 (2022).
DOI: 10.1007/978-3-031-04496-0_2

181. Katayun Barmak, Ryan Gusley, "On epitaxial electrodeposition of Co, Cu and Ru for interconnect applications", J. Electrochem. Soc. **169**, 082517 (2022).
DOI: 10.1149/1945-7111/ac8771

180. Deepankur Thureja, Atac Imamoglu, Tomasz Smoleński, Ivan Amelio, Alexander Popert, Thibault Chervy, Xiaobo Lu, Song Liu, Katayun Barmak, Kenji Watanabe, Takashi Taniguchi, David J. Norris, Martin Kroner, Puneet A. Murthy, "Electrically tunable quantum confinement of neutral excitons", Nature, **606**, 298-304 (2022).
DOI: 10.1038/s41586-022-04634-z

179. Qianhui Shi, En-Min Shih, Daniel Rhodes, Bumho Kim, Katayun Barmak, Kenji Watanabe, Takashi Taniguchi, Zlatko Papić, Dmitry A. Abanin, James Hone and Cory R. Dean, "BilayerWSe_2 as a natural platform for interlayer exciton condensates in the strong coupling limit", Nature Nanotechnol. **17**, 577-582 (2022).
DOI: 10.1038/s41565-022-01104-5

178. Elyse Barré, Ouri Karni, Erfu Liu, Aidan L. O'Beirne, Xueqi Chen, Henrique B. Ribeiro, Leo Yu,Bumho Kim, Kenji Watanabe, Takashi Taniguchi, Katayun Barmak, Chun Hung Lui, Sivan Refaely-Abramson, Felipe H. da Jornada, Tony F. Heinz, "Optical absorption of interlayer excitons in transition-metal dichalcogenide heterostructures", Science **376**, 406–410 (2022).
DOI: 10.1126/science.abm8511

177. Ouri Karni, Elyse Barré, Vivek Pareek, Johnathan D. Georgaras, Michael K. L. Man, Chakradhar Sahoo, David R. Bacon, Xing Zhu, Henrique B. Ribeiro, Aidan L. O'Beirne, Jenny Hu, Abdullah Al-Mahboob, Mohamed M. M. Abdelrasoul, Nicholas S. Chan, Arka Karmakar, Andrew J. Winchester, Bumho Kim, Kenji Watanabe, Takashi Taniguchi, Katayun Barmak, Julien Madéo, Felipe H. da Jornada, Tony F. Heinz and Keshav M. Dani, "Structure of the moiré exciton captured by imaging its electron and hole", Nature **603,** 247–252 (2022).
DOI: 10.1038/s41586-021-04360-y

176. Bumho Kim, Yue Luo, Daniel Rhodes, Yusong Bai, Jue Wang, Song Liu, Abraham Jordan, Baili Huang,Zhaochen Li, Takashi Taniguchi, Kenji Watanabe, Jonathan Owen, Stefan Strauf, Katayun Barmak, Xiaoyang Zhu, and James Hone, "Free trions with near unity quantum yield in monolayer $MoSe_2$", ACS Nano **16**,140–147 (2022).
DOI: 10.1021/acsnano.1c04331

175. *(Featured Article)* Ryan Gusley, Quintin Cumston, Kevin R. Coffey, Alan C. West, Katayun Barmak, "Electrodeposition of Cu(111) onto a Ru(0001) seed layer for epitaxial Cu interconnects", J. Appl. Phys. **130**, 135301 (2021) and **131**, 209903 (2022).
DOI: 10.1063/5.0063418 and 10.1063/5.0097197
Cover of the October issue of J. Appl. Phys.
https://aip.scitation.org/action/showLargeCover?doi=10.1063%2Fjap.2021.130.issue-13

174. Ryan Gusley, Quintin Cumston, Kevin R. Coffey, Alan C. West, Katayun Barmak, "Electrodeposition of Ru onto Ru and Au seed layers from solutions of ruthenium nitrosyl sulfate and ruthenium chloride", J. Electrochem. Soc. **168**, 052504 (2021).
DOI: 10.1149/1945-7111/abff68

173. Daniel Rhodes, Apoorv Jindal, Noah F. Q. Yuan, Younghun Jung, Abhinandan Antony, HuaWang, Bumho Kim, Yu-che Chiu, Takashi Taniguchi, Kenji Watanabe, Katayun Barmak, Luis Balicas, Cory R. Dean, Xiaofeng Qian, Liang Fu, Abhay N. Pasupathy, James Hone, "Enhanced superconductivity in monolayer T_d-$MoTe_2$ with tilted Ising spin texture", ACS Nano Lett. **21**, 2505-2511 (2021).
DOI: 10.1021/acs.nanolett.0c04935

172. Jue Wang, Qianhui Shi, En-Min Shih, Lin Zhou, Wenjing Wu, Yusong Bai, Daniel Rhodes, Katayun Barmak, James Hone, Cory R. Dean, and X.-Y. Zhu, "Diffusivity reveals three distinct layers of excitons in $MoSe_2$/WSe_2 heterobilayers", Phys. Rev. Lett. **126**, 106804 (2021).
DOI: 10.1103/PhysRevLett.126.106804

171. Lorenz Maximilian Schneider, Shanece S. Esdaille, Daniel A. Rhodes, Katayun Barmak, James C. Hone, Arash Rahimi-Iman, "Direct measurement of the radiative pattern of bright and dark excitons and exciton complexes in encapsulated tungsten diselenide", Nature Sci. Rep., 10:8091 (2020).
DOI: 10.1038/s41598-020-64838

170. Ryan Gusley, Sameer Ezzat, Kevin. R. Coffey, Alan C. West, Katayun Barmak, "Influence of the seed layer and electrolyte on the epitaxial electrodeposition of Co(0001) for the fabrication of single crystal interconnects", J. Electrochem. Soc. **167** 162503 (2020).
DOI: 10.1149/1945-7111/abcd13

169. Lorenz Maximilian Schneider, Shanece S. Esdaille, Daniel A. Rhodes, Katayun Barmak, James C. Hone, Arash Rahimi-Iman, "Optical dispersion of valley-hybridised coherent excitons with momentum-dependent valley polarisation in monolayer semiconductor", 2D Mater. **8** 015009 (2020).
DOI: 10.1088/2053-1583/abb5eb

168. Katayun Barmak, Kadir Sentosun, Amirali Zangiabadi, Erik Milosevic, Daniel Gall, Miroslav Zecevic, Ricardo Lebensohn, Jerrold Floro, "Defects in epitaxial Ru(0001) layers on sapphire(0001) substrates: dislocations, stacking faults and deformation twins", J. Appl. Phys. **128**, 045304 (2020).
DOI: 10.1063/5.0015188

167. *(Featured Article)* Katayun Barmak, Sameer Ezzat, Ryan Gusley, Atharv Jog, Sit Kerdsongpanya, Asim Khanya, Erik Milosevic, William Richardson, Kadir Sentosun, Amirali Zangiabadi, Daniel Gall, William E. Kaden, Eduardo R. Mucciolo, Patrick K. Schelling, Alan C. West, Kevin R. Coffey, "Epitaxial metals for interconnects beyond Cu", J. Vac. Sci. Technol. A **38**, 033406 (2020).
DOI: 10.1116/6.0000018

166. Yanhao Tang, Lizhong Li, Tingxin Li, Yang Xu, Song Liu, Katayun Barmak, Kenji Watanabe, Takashi Taniguchi, Allan H MacDonald, Jie Shan, Kin Fai Mak, "WSe_2/WS_2 moiré superlattices: a new Hubbard model simulator", Nature **579**, 353-360 (2020).
DOI: 10.1038/s41586-020-2085-3

165. *(Editor's Suggestion)* Ouri Karni, Elyse Barré, Sze Cheung Lau, Roland Gillen, Eric Yue Ma, Bumho Kim, Kenji Watanabe, Takashi Taniguchi, Janina Maultzsch, Katayun Barmak, Ralph H. Page and Tony F. Heinz, "Infrared interlayer exciton emission in MoS_2/WSe_2 heterostructures", Phys. Rev. Lett. **123**, 247402 (2019).
DOI: 10.1103/PhysRevLett.123.247402

164. Lorenz Maximilian Schneider, Shanece S. Esdaille, Daniel A. Rhodes, Katayun Barmak, James C. Hone, and Arash Rahimi-Iman, "Shedding light on the monolayer WSe_2 exciton's nature by optical effective mass measurements", Optics Express **27**, 37131 (2019).
DOI: 10.1364/OE.27.037131

163. Drew Edelberg, Daniel Rhodes, Alexander Kerelsky, Bumho Kim, Jue Wang, Amirali Zangiabadi, Chanul Kim, Antony Abhinandan, Jenny Ardelean, Micheal Scully, Declan Scullion, Lior Embon, Rui Zu, Elton J. G. Santos, Luis Balicas, Chris Marianetti, Katayun Barmak, Xiaoyang Zhu, James Hone and Abhay N. Pasupathy, "Approaching the intrinsic limit in transition metal diselenides via point defect control", Nano Lett. **19**, 4371-4379 (2019).
DOI: 10.1021/acs.nanolett.9b00985

162. Soham Banerjee, Akbar Mahdavi-Shakib, Samra Husremovik, Amirali Zangiabadi, Brian G. Frederick, Katayun Barmak, Rachel Narehood Austin, Simon J. L. Billinge, "Quantitative structural characterization of catalytically active TiO_2 nanoparticles", ACS. Applied Nano Mater. **2**, 6268-6276 (2019).
DOI: /10.1021/acsanm.9b01246

161. Ryan Gusley, Kadir Sentosun, Sameer Ezzat, Kevin. R. Coffey, Alan C. West, Katayun Barmak, "Electrodeposition of Epitaxial Co on Ru(0001)/Al_2O_3(0001)", J. Electrochem. Soc. **166,** D875-D881 (2019).
DOI: 10.1149/2.1091915jes

160. W. Cao, J. Liu, A. Zangiabadi, K. Barmak, W.E. Bailey, "Measurement of spin mixing conductance in $Ni_{81}Fe_{19}$/α-W and $Ni_{81}Fe_{19}$/β-W heterostructures via ferromagnetic resonance", J. Appl. Phys. **126**, 043902 (2019).
DOI: 10.1063/1.5099913

159. Erik Milosevic, Sit Kerdsongpanya, Mary E. McGahay, Amirali Zangiabadi, Katayun Barmak, Daniel Gall, "Resistivity scaling in epitaxial Co(0001) layers", J. Appl. Phys. **125**, 245105 (2019).
DOI: 10.1063/1.5086458

158. Sameer S. Ezzat, Prabhu Doss Mani, Asim Khaniya, William Kaden, Daniel Gall, Katayun Barmak, Kevin R. Coffey, "Resistivity and surface scattering of (0001) single crystal ruthenium thin films", J. Vacuum Sci. Technol. A **37**, 031516 (2019).
DOI: 10.1116/1.5093494

157. *(Critical Review)* Emily Hsu, Katayun Barmak, Alan West, Ah-Hyung Park, "Advancements in the treatment and processing of electronic waste: a review of metal extraction and review technologies", Green Chemistry **21**, 919 (2019).
DOI: 10.1039/c8gc03688h

156. Gabriel Martine La Boissonière, Rustum Choksi, Katayun Barmak, Selim Esedoglu, "Statistics of grain growth: experiment versus the phase-field-crystal and Mullins models", Materialia **6**, 100280 (2019).
DOI: 10.1016/j.mtla.2019.100280

155. Yue Luo, Gabriella D. Shepard, Jenny V. Ardelean, Daniel A. Rhodes, Bumho Kim, Katayun Barmak, James C. Hone and Stefan Strauf, "Deterministic coupling of site-controlled quantum emitters in monolayer WSe_2 to plasmonic nanocavities", Nature Nanotechnology **13**, 1137-1142 (2018).
DOI: 0.1038/s41565-018-0275-z

154. Erik Milosevic, Sit Kerdsongpanya, Amirali Zangiabadi, Katayun Barmak, Kevin R. Coffey, Daniel Gall, "Resistivity size effect in epitaxial Ru(0001) layers", J. Appl. Phys. **124**, 165105 (2018).
DOI: 10.1063/1.5046430

153. Evan J. Telford, Avishai Benyamin, Daniel Rhodes, Da Wang, Younghun Jung, Simon Turkel, Amirali Zangiabadi, Kenji Watanabe, Takashi Taniguchi, Shuang Jia, Katayun Barmak, Abhay N. Pasupathy, Cory R. Dean, James Hone, "Via Method for Lithography Free Contact and Preservation of 2D Materials", Nano letters **18**, 14161420 (2018).
DOI: 10.1021/acs.nanolett.7b05161

152. *(Invited)* P. Bardsley, K. Barmak, E. Eggeling, Y. Epshteyn, D. Kinderlehrer, S. Ta'asan, "Towards a gradient flow for microstructure", Rend. Lincei Mat. Appl. **28**, 777-805 (2017).
DOI: 10.4171/RLM/785

151. Katayun Barmak, Jiaxing Liu, "Impact of deposition rate, underlayers and substrates on β-W formation in sputter deposited films", J. Vac. Soc. Technol. A **35**, 061516 (2017).
DOI: 10.1116/1.5003628

150. D. Choi, K. Barmak, "On the Potential of Tungsten as Next-generation Semiconductor Interconnects", Electronic Mater. Lett. **13**, 449-456 (2017).
DOI 10.1007/s13391-017-1610-5

149. Jyotirmoy Mandal, Derek Wang, Adam C. Overvig, Norman N. Shi, Daniel Paley, Amirali Zangiabadi, Qian Cheng, Katayun Barmak, Nanfang Yu, and Yuan Yang, "Scalable, "dip-and-dry" fabrication of a wide-angle plasmonic selective absorber for high-efficiency solar–thermal energy conversion", Adv. Mater. **29**, 1702156 (2017).
DOI: 10.1002/adma.201702156

148. Katayun Barmak, Jiaxing Liu, Liam Harlan, Penghao Xiao, Juliana Duncan, Graeme Henkelman, "Transformation of topologically close-packed β-W to body-centered cubic α-W: comparison of experiments and computations", J. Chem. Phys. **147**, 152709 (2017).
DOI: 10.1063/1.4995261

147. Gregory S. Rohrer, Xuan Liu, Jiaxing Liu, Amith Darbal, Madeleine N. Kelly, Xiwen Chen, Michael A. Berkson, Noel T. Nuhfer, Kevin R. Coffey, Katayun Barmak, "The grain boundary character distribution of a highly twinned nanocrystalline aluminum thin film compared to bulk microcrystalline aluminum", J. Mater. Sci. **52**, 9819–9833 (2017).
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