



## Bruce Clemens

Walter B. Reinhold Professor in the School of Engineering and Professor of Photon Science

Materials Science and Engineering

### CONTACT INFORMATION

- **Administrator**

Benita Givens - Administrative Associate

**Email** bgivens@stanford.edu

**Tel** 650-723-0698

### Bio

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#### BIO

Clemens studies growth and structure of thin film, interface and nanostructured materials for catalytic, electronic and photovoltaic applications. He and his group investigate phase transitions and kinetics in nanostructured materials, and perform nanoparticle engineering for hydrogen storage and catalysis. Recently he and his collaborators have developed nano-portals for efficient injection of hydrogen into storage media, dual-phase nanoparticles for catalysis, amorphous metal electrodes for semiconductor devices, and a lift-off process for forming free-standing, single-crystal films of compound semiconductors.

#### ACADEMIC APPOINTMENTS

- Professor, Materials Science and Engineering
- Professor, Photon Science Directorate
- Affiliate, Precourt Institute for Energy
- Affiliate, Stanford Woods Institute for the Environment

#### ADMINISTRATIVE APPOINTMENTS

- Director, Stanford Nano Shared Facilities, (2016- present)

#### PROFESSIONAL EDUCATION

- PhD, Caltech (1983)

#### LINKS

- Clemens Research Group: <http://stanford.edu/group/clemensgroup>

### Teaching

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#### COURSES

##### 2018-19

- Kinetics of Materials Synthesis: MATSCI 145 (Aut)
- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: MATSCI 156 (Win, Sum)

- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: MATSCI 256 (Win, Sum)

#### 2017-18

- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: EE 293A, ENERGY 293A, MATSCI 156, MATSCI 256 (Win, Sum)
- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: MATSCI 256 (Sum)

#### 2016-17

- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: EE 293A, ENERGY 293A, MATSCI 156, MATSCI 256 (Aut)
- Waves and Diffraction in Solids: MATSCI 195, MATSCI 205, PHOTON 205 (Win)

#### 2015-16

- Nanomaterials Synthesis: MATSCI 155 (Spr)
- Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution: EE 293A, ENERGY 293A, MATSCI 156, MATSCI 256 (Aut)
- Waves and Diffraction in Solids: MATSCI 195, MATSCI 205, PHOTON 205 (Win)

## STANFORD ADVISEES

### Master's Program Advisor

Grace Busse

## Publications

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### PUBLICATIONS

- **Copper interstitial recombination centers in Cu<sub>3</sub>N** *PHYSICAL REVIEW B*  
Yee, Y., Inoue, H., Hultqvist, A., Hanifi, D., Salleo, A., Magyari-Kope, B., Nishi, Y., Bent, S. F., Clemens, B. M.  
2018; 97 (24)
- **Nanoparticles via vapor phase condensation for energy applications**  
Clemens, B., Gibbons, B., Wetter, M., Higgins, D., Jaramillo, T., Baker, J., Bent, S., Mehta, A., Davis, R.  
AMER CHEMICAL SOC.2018
- **Hydrogen Flux through Size Selected Pd Nanoparticles into Underlying Mg Nanofilms** *ADVANCED ENERGY MATERIALS*  
Kumar, S., Pavloudis, T., Singh, V., Nguyen, H., Steinhauer, S., Pursell, C., Clemens, B., Kioseoglou, J., Grammatikopoulos, P., Sowwan, M.  
2018; 8 (4)
- **Photoelectrochemical Water Oxidation by GaAs Nanowire Arrays Protected with Atomic Layer Deposited NiO (x) Electrocatalysts**  
Zeng, J., Xu, X., Parameshwaran, V., Baker, J., Bent, S., Wong, H., Clemens, B.  
SPRINGER.2018: 932–37
- **Threshold Fluence Measurement for Laser Liftoff of InP Thin Films by Selective Absorption** *ADVANCED ENGINEERING MATERIALS*  
Jan, A., Reeves, B. A., de Burgt, Y., Hayes, G. J., Clemens, B. M.  
2018; 20 (1)
- **Effect of Backbone Chemistry on the Structure of Polyurea Films Deposited by Molecular Layer Deposition** *CHEMISTRY OF MATERIALS*  
Bergsman, D. S., Closser, R. G., Tassone, C. J., Clemens, B. M., Nordlund, D., Bent, S. F.  
2017; 29 (3): 1192-1203
- **THERMAL CONDUCTIVITY MEASUREMENT OF IN(0.10)GA(0.90)AS(0.96)N(0.04) THIN FILM**  
Jan, A., Cheaito, R., Goodson, K. E., Clemens, B. M., ASME  
AMER SOC MECHANICAL ENGINEERS.2017
- **Crystallinity, Surface Morphology, and Photoelectrochemical Effects in Conical InP and InN Nanowires Grown on Silicon.** *ACS applied materials & interfaces*  
Parameshwaran, V., Xu, X., Clemens, B.  
2016; 8 (33): 21454-21464

- **Hydrogenation of Mg nanofilms catalyzed by size-selected Pd nanoparticles: Observation of localized MgH<sub>2</sub> nanodomains** *JOURNAL OF CATALYSIS*  
Kumar, S., Singh, V., Cassidy, C., Pursell, C., Nivargi, C., Clemens, B., Sowwan, M.  
2016; 337: 14-25
- **Growth, intermixing, and surface phase formation for zinc tin oxide nanolaminates produced by atomic layer deposition** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY A*  
Hagglund, C., Grehl, T., Tanskanen, J. T., Yee, Y. S., Mullings, M. N., Mackus, A. J., MacIsaac, C., Clemens, B. M., Brongersma, H. H., Bent, S. F.  
2016; 34 (2)
- **Electrochemical Reduction Properties of Extended Space Charge InGaP and GaP Epitaxial Layers** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Parameshwaran, V., Xu, X., Clemens, B.  
2016; 163 (8): H714-H721
- **Morphological Control of GaN and Its Effect within Electrochemical Heterojunctions** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Parameshwaran, V., Clemens, B.  
2016; 163 (10): H958-H963
- **Deep recombination centers in Cu<sub>2</sub>ZnSnSe<sub>4</sub> revealed by screened-exchange hybrid density functional theory** *PHYSICAL REVIEW B*  
Yee, Y. S., Magyari-Koepe, B., Nishi, Y., Bent, S. F., Clemens, B. M.  
2015; 92 (19)
- **Amorphized tantalum-nickel binary films for metal gate applications** *APPLIED PHYSICS LETTERS*  
Ouyang, J., Wongpiya, R., Deal, M. D., Clemens, B. M., Nishi, Y.  
2015; 106 (15)
- **Laser liftoff of gallium arsenide thin films** *MRS COMMUNICATIONS*  
Hayes, G. J., Clemens, B. M.  
2015; 5 (1): 1-5
- **Structural and electrical characterization of CoTiN metal gates** *JOURNAL OF APPLIED PHYSICS*  
Wongpiya, R., Ouyang, J., Chung, C., Duong, D. T., Deal, M., Nishi, Y., Clemens, B.  
2015; 117 (7)
- **Nanometer-scale hydrogen 'portals' for the control of magnesium hydride formation** *PHYSICAL CHEMISTRY CHEMICAL PHYSICS*  
Chung, C., Nivargi, C., Clemens, B.  
2015; 17 (43): 28977-28984
- **Bifacial solar cell with SnS absorber by vapor transport deposition** *APPLIED PHYSICS LETTERS*  
Wangperawong, A., Hsu, P., Yee, Y., Herron, S. M., Clemens, B. M., Cui, Y., Bent, S. F.  
2014; 105 (17)
- **Structural evolution of platinum thin films grown by atomic layer deposition** *JOURNAL OF APPLIED PHYSICS*  
Geyer, S. M., Methaapanon, R., Johnson, R., Brennan, S., Toney, M. F., Clemens, B., Bent, S.  
2014; 116 (6)
- **Influence of packaging on the surface oxidation and magnetic properties of cobalt nanocrystals** *JOURNAL OF PHYSICS D-APPLIED PHYSICS*  
Bohra, M., Singh, V., Sowwan, M., Bobo, J., Chung, C., Clemens, B.  
2014; 47 (30)
- **Understanding Interactions between Manganese Oxide and Gold That Lead to Enhanced Activity for Electrocatalytic Water Oxidation.** *Journal of the American Chemical Society*  
Gorlin, Y., Chung, C., Benck, J. D., Nordlund, D., Seitz, L., Weng, T., Sokaras, D., Clemens, B. M., Jaramillo, T. F.  
2014; 136 (13): 4920-4926
- **Rapid liftoff of epitaxial thin films** *JOURNAL OF MATERIALS RESEARCH*  
Hayes, G. J., Clemens, B. M.  
2013; 28 (18): 2564-2569
- **Vapor transport deposition and epitaxy of orthorhombic SnS on glass and NaCl substrates** *APPLIED PHYSICS LETTERS*  
Wangperawong, A., Herron, S. M., Runser, R. R., Haegglund, C., Tanskanen, J. T., Lee, H., Clemens, B. M., Bent, S. F.

2013; 103 (5)

- **Amorphous thin film TaWSiC as a diffusion barrier for copper interconnects** *APPLIED PHYSICS LETTERS*  
Wongpiya, R., Ouyang, J., Kim, T. R., Deal, M., Sinclair, R., Nishi, Y., Clemens, B.  
2013; 103 (2)
- **Dilute phosphide nitride materials as photocathodes for electrochemical solar energy conversion** *Conference on Physics, Simulation, and Photonic Engineering of Photovoltaic Devices II*  
Parameshwaran, V., Xu, X., Kang, Y., Harris, J., Wong, H. P., Clemens, B.  
SPIE-INT SOC OPTICAL ENGINEERING.2013
- **Effect of Composition on Structural and Electrical Properties of Amorphous Ta-W-Si-C Metal Thin Films** *ECS SOLID STATE LETTERS*  
Ouyang, J., Wongpiya, R., Grubbs, M. E., Deal, M. D., Clemens, B. M., Nishi, Y.  
2013; 2 (10): P86-P88
- **Mn3O4 Supported on Glassy Carbon: An Active Non-Precious Metal Catalyst for the Oxygen Reduction Reaction** *ACS CATALYSIS*  
Gorlin, Y., Chung, C., Nordlund, D., Clemens, B. M., Jaramillo, T. F.  
2012; 2 (12): 2687-2694
- **Nucleation-Controlled Growth of Nanoparticles by Atomic Layer Deposition** *CHEMISTRY OF MATERIALS*  
Lee, H., Mullings, M. N., Jiang, X., Clemens, B. M., Bent, S. F.  
2012; 24 (21): 4051-4059
- **Theory and Experiments of the Impact of Work-Function Variability on Threshold Voltage Variability in MOS Devices** *IEEE TRANSACTIONS ON ELECTRON DEVICES*  
Zhang, X., Mitard, J., Ragnarsson, L., Hoffmann, T., Deal, M., Grubbs, M. E., Li, J., Magyari-Kope, B., Clemens, B. M., Nishi, Y.  
2012; 59 (11): 3124-3126
- **Biaxially-textured photovoltaic film crystal silicon on ion beam assisted deposition CaF2 seed layers on glass** *ENERGY & ENVIRONMENTAL SCIENCE*  
Groves, J. R., Li, J. B., Clemens, B. M., LaSalvia, V., Hasoon, F., Branz, H. M., Teplin, C. W.  
2012; 5 (5): 6905-6908
- **Interfacial Alloy Hydride Destabilization in Mg/Pd Thin Films** *PHYSICAL REVIEW LETTERS*  
Chung, C., Lee, S., Groves, J. R., Brower, E. N., Sinclair, R., Clemens, B. M.  
2012; 108 (10)
- **Investigating the Role of Grain Boundaries in CZTS and CZTSSe Thin Film Solar Cells with Scanning Probe Microscopy** *ADVANCED MATERIALS*  
Li, J. B., Chawla, V., Clemens, B. M.  
2012; 24 (6): 720-?
- **Biaxial texture development in the ion beam assisted deposition of magnesium oxide** *17th International Conference on Ion Beam Modification of Materials (IBMM)*  
Groves, J. R., Hammond, R. H., Matias, V., DePaula, R. F., Stan, L., Clemens, B. M.  
ELSEVIER SCIENCE BV.2012: 28–32
- **Understanding the Role of Grain Boundaries in Sulfide Thin Film Solar Cells with Scanning Probe Microscopy** *38th IEEE Photovoltaic Specialists Conference (PVSC)*  
Li, J. B., Chawla, V., Clemens, B. M.  
IEEE.2012
- **Effect of Composition on High Efficiency CZTSSe Devices Fabricated Using Co-sputtering of Compound Targets** *38th IEEE Photovoltaic Specialists Conference (PVSC)*  
Chawla, V., Clemens, B.  
IEEE.2012: 2990–2992
- **MRS serves the global materials community** *MRS BULLETIN*  
Clemens, B., M.  
2012
- **Understanding the role of grain boundaries in sulfide thin film solar cells with scanning probe microscopy**  
Li, J., B., Chawla, V., Clemens, B., M.

2012

- **Computational materials science and MRS** *MRS BULLETIN*  
Clemens, B., M.  
2012: 709-10
- **III-V nitride semiconductors for solar hydrogen production**  
Parameshwaran, V., Gallinat, C., Enck, Ryan, W., Sampath, Anand, V., Shen, Paul, H., Kuykendall, T., Clemens, B. M.  
2012
- **Biaxial texture development in the ion beam assisted deposition of magnesium oxide** *Nuclear Inst. and Methods in Physics Research, B*  
Groves, J., R., Hammond, R., H., Matias, V., DePaula, R., F., Stan, L., Clemens, B., M.  
2012; 272 (C): 28–32
- **The Materials Research Society Foundation to benefit wide range of initiatives** *MRS BULLETIN*  
Clemens, B., M.  
2012
- **MRS enhances commitment to spreading the word about materials** *MRS BULLETIN*  
Clemens, B., M.  
2012; 37: 1–1
- **III-V nitride semiconductors for solar hydrogen production** *Conference on Energy Harvesting and Storage - Materials, Devices, and Applications III*  
Parameshwaran, V., Gallinat, C., Enck, R. W., Sampath, A. V., Shen, P. H., Kuykendall, T., Aloni, S., Wraback, M., Clemens, B. M.  
SPIE-INT SOC OPTICAL ENGINEERING.2012
- **Plasmon Enhanced Solar-to-Fuel Energy Conversion** *NANO LETTERS*  
Thomann, I., Pinaud, B. A., Chen, Z., Clemens, B. M., Jaramillo, T. F., Brongersma, M. L.  
2011; 11 (8): 3440-3446
- **The Role of Nucleation Surfaces in the Texture Development of Magnesium Oxide During Ion Beam Assisted Deposition** *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY*  
Groves, J. R., Matias, V., DePaula, R. F., Stan, L., Hammond, R. H., Clemens, B. M.  
2011; 21 (3): 2904-2907
- **Porous Mg formation upon dehydrogenation of MgH<sub>2</sub> thin films** *JOURNAL OF APPLIED PHYSICS*  
Dura, J. A., Kelly, S. T., Kienzle, P. A., Her, J., Udovic, T. J., Majkrzak, C. F., Chung, C., Clemens, B. M.  
2011; 109 (9)
- **Hydrogen Spillover in Pt-Single-Walled Carbon Nanotube Composites: Formation of Stable C-H Bonds** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*  
Bhowmick, R., Rajasekaran, S., Friebe, D., Beasley, C., Jiao, L., Ogasawara, H., Dai, H., Clemens, B., Nilsson, A.  
2011; 133 (14): 5580-5586
- **Calorimetry of epitaxial thin films** *REVIEW OF SCIENTIFIC INSTRUMENTS*  
Cooke, D. W., Hellman, F., Groves, J. R., Clemens, B. M., Moyerman, S., Fullerton, E. E.  
2011; 82 (2)
- **Plasmon Enhanced Solar-to-Fuel Energy Conversion** *NanoLett.*  
Thomann, I., Pinaud, Blaise, A., Chen, Z., Clemens, Bruce, M., Jaramillo, Thomas, F., Brongersma, Mark, L.  
2011; 11: 3440
- **Development and characterization of high temperature stable Ta-W-Si-C amorphous metal gates** *APPLIED PHYSICS LETTERS*  
Grubbs, M. E., Zhang, X., Deal, M., Nishi, Y., Clemens, B. M.  
2010; 97 (22)
- **Moving interface hydride formation in multilayered metal thin films** *JOURNAL OF APPLIED PHYSICS*  
Kelly, S. T., Clemens, B. M.  
2010; 108 (1)
- **Resonant Germanium Nanoantenna Photodetectors** *NANO LETTERS*

Cao, L., Park, J., Fan, P., Clemens, B., Brongersma, M. L.  
2010; 10 (4): 1229-1233

- **Bilayer metal gate electrodes with tunable work function: Mechanism and proposed model** *JOURNAL OF APPLIED PHYSICS*  
Lu, C., Wong, G. M., Birringer, R., Dauskardt, R., Deal, M. D., Clemens, B. M., Nishi, Y.  
2010; 107 (6)
- **INEXPENSIVE, ABUNDANT, NON-TOXIC THIN FILMS FOR SOLAR CELL APPLICATIONS GROWN BY REACTIVE SPUTTERING** *35th IEEE Photovoltaic Specialists Conference*  
Chawla, V., Clemens, B.  
IEEE.2010: 1902–1905
- **Biaxial Texturing of Inorganic Photovoltaic Thin Films Using Low Energy Ion Beam Irradiation During Growth**  
Clemens, B.  
2010
- **Optimization of Ion Assist Beam Deposition of Magnesium Oxide Template Films During Initial Nucleation and Growth**  
Groves, James, R., Hammond, Robert, H., Matias, V., Stan, L., Depaula, Raymond, F., Clemens, Bruce, M.  
2010
- **Ion-Beam Texturing at Nucleation - Manipulation of Crystallographic Orientation in Cubic Materials at the Nanometer Scale** *Symposium on Ion Beams and Nano-Engineering*  
Groves, J. R., Hammond, R. H., Marshall, A. F., DePaula, R. F., Stan, L., Clemens, B. M.  
MATERIALS RESEARCH SOC.2010: 93–98
- **The Effect of Oxygen on the Work Function of Tungsten Gate Electrodes in MOS Devices** *IEEE ELECTRON DEVICE LETTERS*  
Grubbs, M. E., Deal, M., Nishi, Y., Clemens, B. M.  
2009; 30 (9): 925-927
- **Engineering light absorption in semiconductor nanowire devices** *NATURE MATERIALS*  
Cao, L., White, J. S., Park, J., Schuller, J. A., Clemens, B. M., Brongersma, M. L.  
2009; 8 (8): 643-647
- **Fundamental Aspects of Ion Beam Assisted Deposition of Magnesium Oxide Template Films** *IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY*  
Groves, J. R., DePaula, R. F., Stan, L., Hammond, R. H., Clemens, B. M.  
2009; 19 (3): 3311-3314
- **Kinetic limitations of the Mg<sub>2</sub>Si system for reversible hydrogen storage** *NANOTECHNOLOGY*  
Kelly, S. T., Van Atta, S. L., Vajo, J. J., Olson, G. L., Clemens, B. M.  
2009; 20 (20)
- **Investigation of Early Nucleation Events in Magnesium Oxide During Ion Beam Assisted Deposition** *Symposium on Artificially Induced Grain Alignment in Thin Films held at the 2008 MRS Fall Meeting*  
Groves, J. R., Hammond, R. H., DePaula, R. F., Clemens, B. M.  
MATERIALS RESEARCH SOCIETY.2009: 37–47
- **Ion-beam Texturing at Nucleation –Manipulation of Crystallographic Orientation in Cubic Materials at the Nanometer Scale**  
Groves, J. R., Hammond, R. H., Marshall, A. F., DePaula, R. F., Stan, L., Clemens, B. M.  
2009
- **Investigation of Early Nucleation Events in Magnesium Oxide During Ion Beam Assisted Deposition**  
Groves, J., R, Hammond, R., H, Depaula, R., F, Clemens, B., M  
2009
- **Physical Model of the Impact of Metal Grain Work Function Variability on Emerging Dual Metal Gate MOSFETs and its Implication for SRAM Reliability** *IEEE International Electron Devices Meeting (IEDM 2009)*  
Zhang, X., Li, J., Grubbs, M., Deal, M., Magyari-Kope, B., Clemens, B. M., Nishi, Y.  
IEEE.2009: 51–54
- **Parametric analysis of chirality families and diameter distributions in single-wall carbon nanotube production by the floating catalyst method** *CARBON*  
Bhowmick, R., Clemens, B. M., Cruden, B. A.

2008; 46 (6): 907-922

- **Novel Sieverts' type volumetric measurements of hydrogen storage properties for very small sample quantities** *JOURNAL OF ALLOYS AND COMPOUNDS*  
 Lee, Y., Clemens, B. M., Gross, K. J.  
 2008; 452 (2): 410-413
- **Existence of a second A3 phase in B2 epitaxial CO<sub>2</sub>Cr<sub>1-x</sub>Fe<sub>x</sub>Al thin films** *SOLID STATE COMMUNICATIONS*  
 Kelekar, R., Clemens, B. M.  
 2008; 145 (4): 223-226
- **Parametric analysis of chirality families and diameter distributions in single-wall carbon nanotube production by the coating catalyst method** *Carbon*  
 Bhowmick, R., Clemens, B., M., Cruden, Brett, A.  
 2008; 46: 907-922
- **A Novel Seiverts' type volumetric apparatus for analyzing hydrogen storage properties of very small quantities of samples** *J. Alloys and Compounds*  
 Lee, Y., W., Clemens, B., M., Gross, K.  
 2008; 452: 410-3
- **Formation and dissociation of MgH<sub>2</sub> in epitaxial Mg thin films** *JOURNAL OF APPLIED PHYSICS*  
 Kelekar, R., Giffard, H., Kelly, S. T., Clemens, B. M.  
 2007; 101 (11)
- **X-ray magnetic circular dichroism of Heusler alloy Co<sub>2</sub>Cr<sub>1-x</sub>Fe<sub>x</sub>Al epitaxial thin films** *PHYSICAL REVIEW B*  
 Kelekar, R., Ohldag, H., Clemens, B. M.  
 2007; 75 (1)
- **X-Ray magnetic circular dichroism of Heusler alloy Co<sub>2</sub>Cr<sub>1-x</sub>Fe<sub>x</sub>Al epitaxial thin films** *Phys. Rev. B*  
 Kelekar, R., Ohldag, H., Clemens, B., M.  
 2007; 75: 14429
- **Process integration and electrical properties of bilayer metal gate/high-k MOSFETs**  
 Lu, C., Wong, G., M.T., Deal, M., Clemens, B., M., Nishi, Y.  
 2007
- **Formation and dissociation of MgH<sub>2</sub> in epitaxial Mg thin films** *J. Appl. Phys.*  
 Kelekar, R., Giffard, H., Kelly, S., T., Clemens, B., M.  
 2007; 101: 14311
- **Hydrogen Storage in Pd Nanodisks characterized with a Novel Nanoplasmonic Sensing Scheme** *Nano Letters*  
 Langhammer, C., Zoric, I., Kasemo, B., Clemens, B., M.  
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- **Single layer mesoporous silica thin films as templates for metallic nanoscale arrays** *JOURNAL OF APPLIED PHYSICS*  
 Hussen, G. N., Shirakawa, H., Nix, W. D., Clemens, B. M.  
 2006; 100 (11)
- **Time-resolved imaging of spin transfer switching: Beyond the macrospin concept** *PHYSICAL REVIEW LETTERS*  
 Acremann, Y., Strachan, J. P., Chembrolu, V., Andrews, S. D., Tyliczszak, T., Katine, J. A., Carey, M. J., Clemens, B. M., Siegmman, H. C., Stohr, J.  
 2006; 96 (21)
- **Gold nanoparticles via alloy decomposition and their application to nonvolatile memory** *APPLIED PHYSICS LETTERS*  
 Chandra, A., Clemens, B. M.  
 2005; 87 (25)
- **Characteristics and mechanism of tunable work function gate electrodes using a bilayer metal structure on SiO<sub>2</sub> and HfO<sub>2</sub>** *IEEE ELECTRON DEVICE LETTERS*  
 Lu, C. H., Wong, G. M., Deal, M. D., Tsai, W., Majhi, P., Chui, C. O., Visokay, M. R., Chambers, J. J., Colombo, L., Clemens, B. M., Nishi, Y.  
 2005; 26 (7): 445-447
- **Properties of Heusler alloy Co<sub>2</sub>Cr<sub>1-x</sub>Fe<sub>x</sub>Al superlattices and spin valves** *APPLIED PHYSICS LETTERS*  
 Kelekar, R., Clemens, B. M.

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- **Strain-assisted nanoscale patterning of Co thin films** *PHYSICAL REVIEW B*  
Lee, Y. W., Clemens, B. M.  
2005; 71 (24)
- **Combinatorial studies of mechanical properties of Ti-Al thin films using nanoindentation** *ACTA MATERIALIA*  
Han, S. M., Shah, R., Banerjee, R., Viswanathan, G. B., Clemens, B. M., Nix, W. D.  
2005; 53 (7): 2059-2067
- **The role of metal catalyst in near ambient hydrogen adsorption on multi-walled carbon nanotubes** *Symposium on Materials for Hydrogen Storage held at the 2004 MRS Fall Meeting*  
Lee, Y. W., Deshpande, R., Dillon, A. C., Heben, M. J., DAI, H. J., Clemens, B. M.  
MATERIALS RESEARCH SOCIETY.2005: 83–88
- **The capacity enhancement of room temperature hydrogen storage in HiPco SWNT by electrochemical deposition of palladium nanoparticles**  
Lee, Y., Bhowmick, R., Clemens, Bruce, M.  
2005
- **"Migration energy" for impurity diffusion in crystalline solids: A closer look** *JOURNAL OF APPLIED PHYSICS*  
Ramanarayanan, P., Srinivasan, B., Cho, K., Clemens, B. M.  
2004; 96 (12): 7095-7107
- **Monodisperse nanoparticles via metal induced crystallization** *JOURNAL OF APPLIED PHYSICS*  
Chandra, A., Clemens, B. M.  
2004; 96 (11): 6776-6781
- **Epitaxial growth of the Heusler alloy Co<sub>2</sub>Cr<sub>1-x</sub>Fe<sub>x</sub>Al** *JOURNAL OF APPLIED PHYSICS*  
Kelekar, R., Clemens, B. M.  
2004; 96 (1): 540-543
- **Surface diffusion mechanisms for strain-induced self-assembly** *PHYSICAL REVIEW B*  
Larsson, M. I., Cho, K., Clemens, B. M.  
2004; 69 (15)
- **Stress induced delamination methods for the study of adhesion of Pt thin films to Si** *ACTA MATERIALIA*  
Lee, A., Clemens, B. M., Nix, W. D.  
2004; 52 (7): 2081-2093
- **Coherency and surface stress effects in metal multilayers** *SCRIPTA MATERIALIA*  
Ramaswamy, V., Nix, W. D., Clemens, B. M.  
2004; 50 (6): 711-715
- **The strain-assisted nucleation and growth behavior of Co islands: An indirect study of nanopatterning using the remanent magnetization measurement (Am)** *Symposium on Nanoparticles and Nanowire Building Blocks held at the 2004 MRS Spring Meeting*  
Lee, Y. W., Clemens, B. M.  
MATERIALS RESEARCH SOCIETY.2004: 145–150
- **The strain-assisted nucleation and growth behavior of Co islands: An indirect study of nanopatterning using the remanent magnetization measurement (Delta M)**  
Lee, Y., W., Clemens, B., M.  
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- **Migration energy for impurity diffusion in crystalline solids: A closer look** *J. Appl. Phys.*  
Ramanarayanan, P., Srinivasan, B., Cho, K., Clemens, B., M.  
2004; 96: 7095-107
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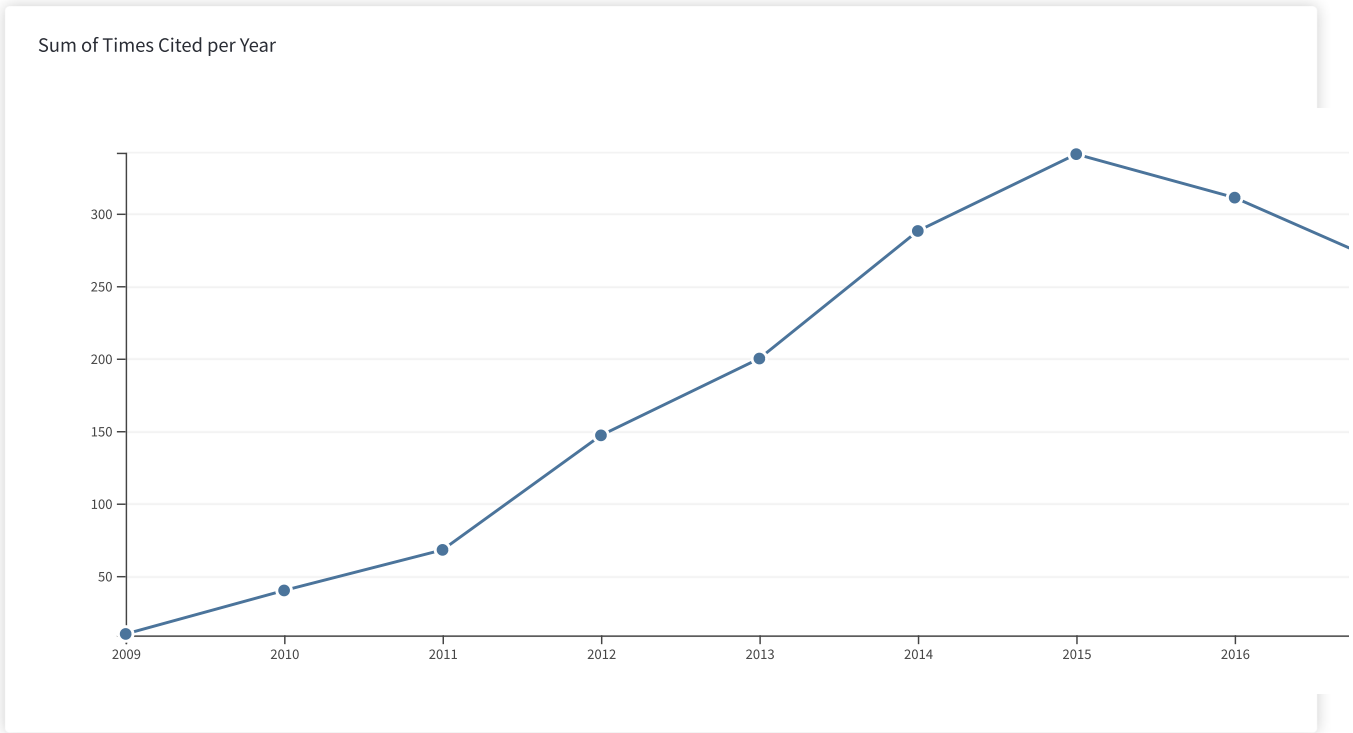
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