

BIOGRAPHICAL SKETCH

PADMA GOPALAN

Professor

Department of Materials Science and Engineering

University of Wisconsin-Madison, WI 53706

Ph: (608) 2654258, Email: pgopalan@engr.wisc.edu

Prof. Gopalan received her Ph.D from Cornell University in Ithaca, NY, in Chemistry. Upon completion she conducted her postdoctoral work in Lucent Technologies, Bell Laboratories, NJ. She is currently a Professor in the Department of Materials Science and Eng. at the University of Wisconsin-Madison, and holds an affiliate appointment in the Departments of Chemistry, Biomedical Engineering, and Chemical and Biological Engineering. Currently her group consists of 6 graduate students and one postdoctoral fellow. Her research is primarily funded by NSF, DOE, ACS, DARPA, Army, and Wisconsin Alumni Research Foundation (WARF). She is the recipient of NSF-CAREER award for 2005 from the polymer program of Division of Materials Research (DMR). From August of 2012 – August 2015 she directed the NSF funded NSEC center at UW and has been instrumental in establishing soft materials characterization facility on campus. She is the recipient of the Romnes Faculty Fellowship from WARF for 2015, the Vilas Distinguished Achievement Professor for 2015-2020, and appointed as Vilas Associate in 2017. She was a Co-leader in NSF-MRSEC center on campus (2015-2018). She was appointed to the prestigious position of a visiting Professor through the World Research Hub at Tokyo Institute of Technology, Japan, from 2018 to 2020.

Education and Training

Delhi University, New Delhi	Chemistry	B.Sc (Hons)	1989
Indian Institute of Technology, New Delhi	Chemistry	M.Sc	1991
Indian Institute of Technology, New Delhi	Polymer Science and Technology	M.S.	1992
Cornell University, Ithaca, NY	Chemistry	Ph.D.	2001

(b) APPOINTMENTS

2018-2020	Specially Appointed World Research Hub Professor, Tokyo Institute of Technology, Japan
2019- current	Professor, Department of Chemical and Biological Engineering, University of Wisconsin-Madison
2015-Present	Vilas Distinguished Achievements Professor, University of Wisconsin-Madison
2015-2018	Co-leader, IRG3 of UW-MRSEC
2014-Present	Professor, Department of Materials Science and Engineering, The Department of Chemistry, University of Wisconsin-Madison
2012-2015	Director, Nanoscale Science and Engineering Center (NSEC)
2006-2015	Co-leader, Thrust 1 of NSEC on “Directed Assembly of Block Copolymers”
2010-2014	Associate Professor, Department of Materials Science and Engineering, The Department of Chemistry, University of Wisconsin-Madison
2003-2010	Assistant Professor, Department of Materials Science and Engineering, The Department of Chemistry, University of Wisconsin-Madison
2001-2003	Post-doctoral Member of Technical Staff, Bell Labs, Lucent Technologies
2000 Summer	Visiting Researcher, IBM Almaden Research Center
1996- 1997	Polymer Consultant, Grindwell Norton Ltd., Bangalore, India
1995-1996	Senior Research Associate, Grindwell Norton Ltd., Bangalore, India
1993-1995	Directors Research Fellow, National Aerospace Laboratories, Bangalore, India

AWARDS AND FELLOWSHIPS

Kellett Mid-Career Award, University of Wisconsin-Madison, 2022-2027
Vilas Associate, University of Wisconsin-Madison, 2017-2019.
Romnes Faculty Fellowships 2015 (Mid-career Award from University of Wisconsin-Madison)
NSF CAREER award from 2005-2010
M. Tech program 1991, Class valedictorian in Indian Institute of Technology, New Delhi.
M.SC. program 1989, Class valedictorian in Indian Institute of Technology, New Delhi.
B.Sc. program 1986, Class valedictorian in Delhi University; Ranked 9th in Delhi University.

GRADUATE AND POSTDOCTORAL ADVISORS

Postdoctoral: H. E. Katz, Bell Labs, NJ. (Now at John’s Hopkins)
Graduate: C. K. Ober, Department of Materials Science and Engineering, Cornell University, Ithaca, NY.

COLLABORATORS

Mike Arnold (UW-Madison), Reid Van Lehn, (UW-Madison), Luke Mawst (UW-Madison), Victor Brar (UW-Madison), Paul Evans (UW-Madison), A.J Boydston (UW-Madison), Chinedum Osuji (UPENN), Martin Zanni (UW-Madison), William Murphy (UW-Madison).

SYNERGISTIC ACTIVITIES

- Editorial Board: *ACS MacroLetters*, *ACS Applied Polymer Materials*.
- Elected member at large in Polymeric Materials Science and Engineering (PMSE) division of ACS. Two-year appointment 2022-2023.

- Participates in activities related to Women in Science and Engineering Program (WISE) to mentor both graduate and undergraduate female students.
- Mentored 50 undergraduates engaged in research in her laboratory. The PI has also worked with 20+ REU students since 2003.
- Organized one ACS symposium (Fall 2012 on Field responsive polymers) and one MRS symposium (Fall 2012 on Nanostructured Materials).
- Co-organized FAPS MACRO 2013 symposium of Nanostructured Materials in May 2013.
- Represent UW-Madison in the signing ceremony and announcement of UW-Plastindia Foundation to initiate the work on Plastindia International University (PIU), along with Prof. Tim Oswald from the ME department at UW-Madison in 2012.
- Established the Soft Materials Characterization Lab at UW-Madison (2006-2014), which is now a self-sustained user facility.

FEDERAL AGENCY WORKSHOPS

- Served on an 8 member panel for NSF on a study tour at the invitation of Dr. Mike Rocco at NSF to evaluate the state of art in 2D materials and the challenges in building nanomodular systems by design <http://www.wtec.org/nmsd/docs/NMSD-FinalReport-Web-Lowres.pdf>; These results and recommendations were presented to NSF early June (2015) by the panel, with a workshop report published late this year (2016).
- Invited participant in the Centinal NSF sponsored workshop "Frontiers in Polymer Science and Engineering" which serves as guideline for future NSF emphasis areas <https://drive.google.com/file/d/0Bwpw1ESJu-GeenJiNWNtWmVndTg/view>.

GRADUATE STUDENTS ADVISED

Victoria E. Campbell (Masters 2005), Sean Cullen (Ph.D. 2008), Melvina Leolukman (Ph.D. 2009), Peerasak Paoprasert (Ph.D. 2010), Eung-Nak Han (Ph.D. 2011), Myounwoong Kim (Ph.D. 2012), Daniel Sweat (Ph.D. 2014), Samantha Schmitt (Ph.D. 2015), Steve Larson (Masters 2015), Jonathan Choi (Ph.D. 2016), Yongho Joo (Ph.D. 2017), Wei Wei (Ph.D. 2019), John Krutty (Ph.D. 2019), Jonathan Dwyer (Ph.D. 2020), Jaehyoung Ko (Masters 2019), Anjali Suresh (Masters 2020), Jian Sun (Ph.D. 2022)

Current Graduate Students: Miguel Ponce, Ri Chen, Junsu Yun, Stephanie Oliveras Santos, Julia Smith.

Total number of graduate students advised: 24 (all listed above).

Total number of postdoctoral scholars sponsored: 16.

POSTDOCTORALS ADVISED

Former Postdocs: Insik In, Yao Wang, Yun Jun Kim, Randy Wang, Changshui Huang, Yaunchun Zhang, Xiang Yu, Alirezha Mohibbi, Peishen Huang, Catherine Kanimozhi, Ayyakkalai Balamurugan, Haridas Kar, Disha Talreja. *Current:* John Krutty, Nikhil Pokharel, Nilabja Maiti

VISITING STUDENTS AND SCIENTISTS ADVISED

Tomoyasu Hirai (Ph.D. Exchange student from Tokyo Institute of Technology)

David Mc Gee (visiting faculty from Drew University, New Jersey)

Saito Yuta (Ph.D. Exchange student from Tokyo Institute of Technology)

Koei Azuma (Ph.D. Exchange student from Tokyo Institute of Technology)

Nichaphat Thongsai (Masters, Visiting student from Thammasat University, Thailand)

Preeyanuch Supchoksoonthorn (Masters, Visiting Student from Thammasat University, Thailand)

PUBLICATIONS: Gopalan's has over 100 publications since 2003 in high impact, highly selective peer reviewed journals such as *Science Advances*, *ACS Macroletters*, *ACS Nano*, *Nano Letters*, *Advanced Materials*, *Soft Matter*, *Langmuir*, *Macromolecules*, *PRL* and *Applied Physics Letters*.

2022

- High transconductance and current density in field effect transistors using arrays of bundled semiconducting carbon nanotubes. Foradori, S. M.; Dwyer, J. H.; Suresh, A.; Gopalan, P.; Arnold, M.; *Applied Physics Letter*, 2022, 121, 073504
- A Simple Simulation-Derived Descriptor for the Deposition of Polymer-Wrapped Carbon Nanotubes on Functionalized Substrates. Shen, Z.; Dwyer, J. H.; Sun, J.; Jinkins, K. R.; Arnold, M.; Gopalan, P.; Van Lehn, R. C. *Soft Matter*, 2022, 18, 4653-4659
- Graphene nanoribbons initiated from molecularly derived seeds. Way, A.; Jacobberger, R.; Guisinger, N.; Saraswat, V.; Zheng, X.; Suresh, A.; Dwyer, J. H.; Gopalan, P.; Arnold, M. *Nature Communication*, 2022, 13,2992
- Uniform amphiphilic cellulose nanocrystal films. Kar, H.; Sun, J.; Clewett, C. F. M.; Thongsai, N.; Paoprasert, P.; Dwyer, J. H.; Gopalan, P. *Polymer Journal*, 2022,54, 7-12
- Selectively Grown Quantum Dot Active Region Lasers. Mawst, L. J.; Kim, H.; Wei, W.; Talreja, D.; Kuech, T. F.; Gopalan, P. *IEEE Journal of Quantum Electronics*, 2022, 4, 2000707
- Formamide Based Monomer for Highly Functionalized Polymers. Chen, R.; Ayyakkalai, B.; Sun, J.; Lee, G. A.; Gopalan, P. *Journal of Polymer Science*, 2022, 1, 131-141
- Photoimageable Organic Coating Bearing Cyclic Dithiocarbonate for Multifunctional Surface. An, S.; Nam, J.; Kanimozhi, C.; Song, Y.; Kim, S.; Shin, N.; Gopalan, P.; Kim, M. *ACS Applied Materials & Interfaces*, 2022, 14, 3274-3283.

2021

- Polymer-Coated Magnetic Microspheres Conjugated with Growth Factor Receptor Binding Peptides Enable Cell Sorting. Krutty, J.D.; Sun, J.; Koesser, K; Murphy, W.L.; Gopalan, P. *ACS Biomaterials Science and Engineering*, 2021,
- Formamide based monomer for highly functionalized polymers" to the Journal of Polymer Science. Chen, Ri.; Sun, J.; Lee, G.; Gopalan, P. *Journal of Polymer Science, Part A*, Accepted
- Synthesis of High Etch Contrast Poly(3-hydroxystyrene)-Based Triblock Copolymers and Self-Assembly of Sub-5 nm Features. Sun, J.; Lee, C.; Osuji, C.; Gopalan, P. *Macromolecules*, 2021, 54, 9542-9550.
- Aligned 2D Carbon Nanotube Liquid Crystals for Wafer-Scale Electronics. Jinkins, K. R.; Foradori, S. M.;Saraswat, V.; Jacobberger, R. M.; Dwyer, J. H.; Gopalan, P.; Berson, A.; Arnold, M. *Science Advances*, 2021, 7, eabh0640
- Using Bottom-Up Lithography and Optical Non-Locality to Create Short-Wave-Infrared Plasmonic Resonances in Graphene. Siegel, J.; Dwyer, J.; Suresh, A.; Safron, N.; Fortman, M.; Wan, C.; Choi, J.; Wei, W.; Saraswat, V.; Behn, W.; Kats, M.; Arnold, M.; Gopalan, P.; Brar, V. *ACS Photonics*, 2021, 5, 1277–1285
- Effects of Labile Mesogens on the Morphology of Liquid Crystalline Block Copolymers in Thin Films. Lee, C.; Ndaya, D.; Bosire, R.; Gabinet, U.; Sun, J.; Gopalan, P.; Kasi, R.; Osuji, C. *Macromolecules*, 2021, 7, 3223-3231
- Chemical and topographical patterns combined with solution shear for selective-area deposition of highly-aligned semiconducting carbon nanotubes. Dwyer, J. H.; Suresh, A.; Jinkins, K. R.; Zheng, X.; Arnold, M. S.; Berson, A.; Gopalan, P. *Nanoscale Advances*, 2021, 3, 1767-1775

- Xeno-Free Bioreactor Culture of Human Mesenchymal Stromal Cells on Chemically Defined Microcarriers. Krutty, J. D.; Koesser, K.; Schwartz, S.; Yun, J.; Murphy, W. L.; Gopalan, P. *ACS Biomaterials Science & Engineering*, **2021**, 7, 617-625

2020

- Highly sensitive and stable sensor for the detection of capsaicin using electrocatalytic carbon dots grafted onto indium tin oxide. Supchoksoonthorn, P.; Thongsai, N.; Wei, W.; Gopalan, P.; Paoprasert, P. *Sensors and Actuators B: Chemical*, **2020**, 329, 129160
- High-capacity adsorbent/sensor from nylon 6 derived carbon dots on SiO₂ substrate via one-step surface grafting. Thongsai, N.; Supchoksoonthorn, P.; Dwyer, J. H.; Wei, W.; Sun, J.; Gopalan, P.; Paoprasert, P. *Materials Science and Engineering: B*, **2020**, 262, 114692
- Customized hydrogel substrates for serum-free expansion of functional hMSCs. Le, N. N. T.; Liu, T. L.; Johnston, J.; Krutty, J. D.; Templeton, K. M.; Dias, A.; Le, H.; Gopalan, P.; Murphy, W. L. *Biomaterials Science*, **2020**, 8, 3819-3829

2019

- Solvent-mediated affinity of polymer-wrapped single-walled carbon nanotubes for chemically modified surfaces. Dwyer, J. H.; Shen, Z.; Jinkins, K. R.; Wei, W.; Arnold, M. S.; Van Lehn, R. C.; Gopalan, P. *Langmuir*, **2019**, 35, 12492-12500
- Phase Behavior of Mixed Polymer Brushes Grown from Ultrathin Coatings. Wei, W.; Kim, T.; Balamurugan, A.; Sun, J.; Chen, R.; Ghosh, A.; Rodolakis, F.; McChesney, J.L.; Lakkham, A.; Evans, P.G.; Hur, S.; Gopalan, P. *ACS Macro Letters*, **2019**, 8, 1086-1090
- Removable Nonconjugated Polymers to Debundle and Disperse Carbon Nanotubes: Catherine Kanimozhi, Matthew J. Shea, Jaehyoung Ko, Wei Wei, Peishen Huang, Michael S. Arnold, Padma Gopalan, *Macromolecules*, **2019**, 52, 4278-4286.

2018

- Impact of InGaAs carrier collection quantum well on the performance of InAs QD active region lasers fabricated by diblock copolymer lithography and selective area epitaxy. Kim, H.; Wei, W.; Kuech, T. F.; Gopalan, P.; Mawst, L. J. *Semiconductor Science and Technology*, **2018**, 34, 025012.
- Synthetic, Chemically Defined Polymer-Coated Microcarriers for the Expansion of Human Mesenchymal Stem Cells. Krutty, J. D.; Dias, A. D.; Yun, J.; Murphy, W. L.; Gopalan, P. *Macromolecular Bioscience*, **2018**, 1800299.
- Photoisomerization Dynamics in a Densely Packed Optically Transformable Azobenzene Monolayer. McElhinny, K. M.; Park, J.; Ahn, Y.; Huang, P.; Joo, Y.; Lakkham, A.; Pateras, H.; Wen, H.; Gopalan, P.; Evans, P. G. *Langmuir*, **2018**, 34, 10828-10836
- Self-Assembly of an Ultrahigh- χ Block Copolymer with Versatile Etch Selectivity. Azuma, K.; Sun, J.; Choo, Y.; Rokhlenko, Y.; Dwyer, J. H.; Schweitzer, B.; Hayakawa, T.; Osuji, C. O.; Gopalan, P. *Macromolecules*, **2018**, 51, 6460-6467
- Exploring Electronic Structure and Order in Polymers via Single-Particle Microresonator Spectroscopy. Horak, E. H.; Rea, M. T.; Heylman, K. D.; Gelbwaser-Klimovsky, D.; Saikin, S. K.; Thompson, B. J.; Kohler, D. D.; Knapper, K. A.; Wei, W.; Pan, F.; Gopalan, P.; Wright, J. C.; Aspuru-Guzik, A.; Goldsmith, R. H. *Nano Letters*, **2018**, 18, 1600-1607
- Substrate-Independent Approach to Dense Cleavable Polymer Brushes by Nitroxide-Mediated Polymerization. Wei, W.; Balamurugan, A.; Dwyer, J. H.; Gopalan, P. *ACS Macro Letters*, **2018**, 7, 100-104

2017

- Selective growth of strained (In)GaAs quantum dots on GaAs substrates employing diblock copolymer lithography nanopatterning. Honghyuk Kim, Jonathan Choi, Zachary Lingley, Miles Brodie, Yongkun Sin, Thomas F. Kuech, Padma Gopalan, Luke J. Mawst. *Journal of Crystal Growth*, **2017**, 465, 48–54.
- Nanotube Alignment Mechanism in Floating Evaporative Self-Assembly. Jinkins, K. R.; Chan, J.; Brady, G. J.; Gronski, K. K.; Gopalan, P.; Evensen, H. T.; Berson, A.; Arnold, M. S. *Langmuir*, **2017**, 33, 13407-13414
- Structurally Analogous Degradable Version of Fluorene-bipyridine Copolymer with Exceptional Selectivity for Large Diameter Semiconducting Carbon Nanotubes. Kanimozhi, C.; Brady, G. J.; Shea, M. J.; Huang, P.; Joo, Yongho.; Arnold, M. S.; Gopalan, P. *ACS Applied Materials and Interfaces*, **2017**, 9, 40736-40742
- Polymer-Free Electronic-Grade Aligned Semiconducting Carbon Nanotube Array. Joo, Y.; Brady, G. J.; Kanimozhi, C.; Ko, J.; Shea, M. J.; Strand, M. T.; Arnold, M. S.; Gopalan, P. *ACS Applied Materials and Interfaces*, **2017**, 9, 28859-28867
- Unit Cell Level Thickness Control of Single-Crystalline Zinc Oxide Nanosheets Enabled by Electrical Double-Layer Confinement. Yin, X.; Shi, Y.; Wei, Y.; Joo, Y.; Gopalan, P.; Szlufarska, I.; Wang, X. *Langmuir*, **2017**, 33, 7708-7714
- Implications of Grain Size Variation in Magnetic Field Alignment of Block Copolymer Blends. Rokhlenko, Y.; Majewski, P. W.; Larson, S. R.; Gopalan, P.; Yager, K. G.; Osuji, C. O. *ACS Macro Letters*, **2017**, 6, 404-409
- Optically Reconfigurable Monolayer of Azobenzene Donor Molecules on Oxide Surfaces. McElhinny, K. M.; Huang, P.; Joo, Y.; Kanimozhi, C.; Lakkham, A.; Sakurai, K.; Evans, P. G.; Gopalan, P. *Langmuir*, **2017**, 33 (9), 2157–2168

2016

- Self-Assembly and Post-Fabrication Functionalization of Microphase Separated Thin Films of a Reactive Azlactone-Containing Block Copolymer. Choi, J. W.; Carter, M. C. D.; Wei, W.; Kanimozhi, C.; SpeetjensII, F. W.; Mahanthappa, M. K.; Lynn, D. M.; Gopalan, P. *Macromolecules*, **2016**, 49, 8177.
- Surface functionalization and dynamics of polymeric cell culture substrates. Krutty, J. D.; Schmitt, S. K.; Gopalan, P.; Murphy, W. L. *Current Opinion in Biotechnology*, **2016**, 40, 164-169.
- Quasi-Ballistic Carbon Nanotube Array Transistors with Current Density Exceeding Si and GaAs. Brady, G. J.; Way, A. J.; Safron, N. S.; Evensen, H. T.; Gopalan, P.; Arnold, M. S. *Science Advances*, **2016**, 2, e1601240.
- Isomeric Effect Enabled Thermally Driven Self-Assembly of Hydroxystyrene-Based Block Copolymers. Kanimozhi, C.; Kim, M.; Larson, S. R.; Choi, J. W.; Choo, Y.; Sweat, D. P.; Osuji, C. O.; Gopalan, P. *ACS Macro Lett.*, **2016**, 5, 833-838
- Effect of Dipolar Molecule Structure on the Mechanism of Graphene-Enhanced Raman Scattering. Joo, Y.; Kim, M.; Kanimozhi, C.; Huang, P.; Wong, B. M.; Roy, S. S.; Arnold, M. S.; Gopalan, P. *J. Phys. Chem. C*, **2016**, 120, 13815-13824.
- Synthesis of Molybdenum Disulfide Nanowire Arrays Using a Block Copolymer Template. Wei, W.; Samad, L.; Choi, J. W.; Joo, Y.; Way, A.; Arnold, M. S.; Jin, S.; Gopalan, P. *Chemistry of Materials*, **2016**, 28, 4017-4023.
- Patterning at the 10 Nanometer Length Scale using a Strongly Segregating Block Copolymer Thin Film and Vapor Phase Infiltration of Inorganic Precursors. Choi, J. W.; Li, Z.; Black, C. T.; Sweat, D. P.; Wang, X.; Gopalan, P. *Nanoscale*, **2016**, 8, 11595-11601.
- Peptide Conjugation to a Polymer Coating via Native Chemical Ligation of Azlactones for Cell Culture. Schmitt, S. K.; Trebatoski, D. J.; Krutty, J. D.; Xie, A. W.; Rollins, B.; Murphy, W. L.; Gopalan, P. *Biomacromolecules*, **2016**, 17, 1040-1047.

2015

- Photo-induced Refractive Index and Topographical Surface Gratings in Functionalized Nanocarbon Solid Film. McGee, D. J.; Ferrie, J.; Plachy, A.; Joo, Y.; Choi, J.; Kanimozhi, C.; Gopalan, P. *Appl. Phys. Lett.*, **2015**, 107, 181102
- Hydrogel Arrays Formed via Differential Wettability Patterning Enable Combinatorial Screening of Stem Cell Behavior. Ngoc Nhi T. Le; Zorn, S.; Schmitt, S. K.; Gopalan, P.; Murphy, W. L. *Acta Biomaterialia*, **2015**, 34, 93-103.
- Magnetic Alignment of Block Copolymer Microdomains by Intrinsic Chain Anisotropy. Rokhlenko, Y.; Zhang, K.; Gopinadhan, M.; Larson, S. R.; Majewski, P. W.; Yager, K. G.; Gopalan, P.; O'Hern, C. S.; Osuji, C. O. *Phys. Rev. Lett.*, **2015**, 115, 258302.
- Zigzag Faceting and Width Refinement of Graphene Nanoribbons and Nanoperforations via Catalyzed Edge-annealing on Cu(111). Safron, N. S.; Choi, J. W.; Kim, M.; Shin, N.; Gopalan, P.; Arnold, M. S. *Solid State Commun*, **2015**, 224, 76-80.
- Isolation of Pristine Electronics Grade Semiconducting Carbon Nanotubes by Switching the Rigidity of the Wrapping Polymer Backbone on Demand. Joo, Y.; Brady, G.; Shea, M.; Oviedo, M.; Kanimozhi, C.; Schmitt, S.; Wong, B.; Arnold, M. S.; Gopalan, P. *ACS Nano*, **2015**.
- From Self-Assembled Monolayers to Coatings: Advances in the Synthesis and Nanobio Applications of Polymer Brushes. (Invited review in the special issue "Advances in Polymer Brushes") Kim, M.; Schmitt, S. K.; Choi, J. W.; Krutty, J. D.; Gopalan, P. *Polymers*, **2015**, 7(7), 1346-1378
- Polyethylene Glycol Coatings on Plastic Substrates for Chemically Defined Stem Cell Culture. Schmitt, S. K.; Xie, A. W.; Ghassemi, R. M.; Trebatoski, D. J.; Murphy, W. L.; Gopalan, P. *Advanced Healthcare Materials*, **2015**, 7(7), 1555-1564
- A Facile Route for Fabricating Graphene Nanoribbon Array Transistors Using Graphoepitaxy of a Symmetric Block Copolymer. Choi, J. W.; Kim, M.; Safron, N. S.; Han, E.; Arnold, M. S.; Gopalan, P. *SPIE Proceedings*, **2015**, 9428, 94280T

2014

- Post-fabrication Placement of Arbitrary Chemical Functionality on Microphase-Separated Thin Films of Amine-Reactive Block Copolymers. Speetjens, F.W.; Carter, M.C.D; Kim, M.; Gopalan, P.; Mahanthappa, M.K.; Lynn, D.M.; *ACS Macro Lett.* **2014**, 3, 1178-1182.
- Rational Design of a Block Copolymer with a High Interaction Parameter. Sweat, D.P; Kim, M.; Larson, S.R.; Choi, J.W.; Choo, Y.; Osuji, C.O.; Gopalan, P.; *Macromolecules* **2014**, 47(19), 6687-6696.
- Phase Behavior of Poly(4-hydroxystyrene-block-styrene) Synthesized by Living Anionic Polymerization of an Acetal Protected Monomer. Sweat, D.P; Kim, M.; Schmitt, A.K.; Perroni, D.V.; Fry, C.F.; Mahanthappa, M.K.; Gopalan, P.; *Macromolecules* **2014**, 47(18), 6302-6310.
- Growth and Characterization of Horizontal GaN Wires on Silicon. Zou, X.; Lu, X.; Lucas, R.; Kuech, T.F.; Choi, J.W.; Gopalan, P.; Lau, K.M.; *Appl. Phys. Lett.* **2014**, 104, 262101.
- Transfer of Pre-Assembled Block Copolymer Thin Film to Nanopattern Unconventional Substrates. Choi, J.W.; Kim, M.; Safron, N.S.; Arnold, M.S.; Gopalan, P. *Appl. Mater. Interfaces* **2014**, 6(12), 9442-9448.
- Dose-Controlled, Floating Evaporative Self-assembly and Alignment of Semiconducting Carbon Nanotubes from Organic Solvents. Joo, Y.; Brady, G.J.; Arnold, M.S.; Gopalan, P. *Langmuir* **2014**, 30(12), 3460-3466.
- Structured Layer of Rhenium Dye on SiO₂ and TiO₂ Surfaces by Langmuir-Blodgett Technique. Joo, Y.; Spalanka, J.; McElhinny, K.; Schmitt, S.; Evans, P.; Gopalan, P. *Langmuir* **2014**, 30(21), 6104-6113.

- Synthesis of Poly(4-Hydroxystyrene)-based Block Copolymers Containing Acid-Sensitive Blocks by Living Anionic Polymerization. Sweat, D.; Yu, X.; Kim, M.; Gopalan, P. *J. Polym. Sci., Part A: Polym. Chem.* **2014**, 52, 1458-1468.
- Dye Self-association Identified by Intermolecular Couplings Between Vibrational Modes as Revealed by Infrared Spectroscopy, and Implications for Electron Injection. Laaser, J.; Christianson, J.; Oudenhoven, T.; Joo, Y.; Gopalan, P.; Schmidt, J.; Zanni, M.; *J. Phys. Chem. C* **2014**, 118(11), 5854-5861.
- High Performance Transistors via Aligned Polyfluorene-sorted Carbon Nanotubes. Brady, G.; Joo, Y.; Singha Roy, S.; Gopalan, P.; Arnold, M.; *Appl. Phys. Lett.* **2014**, 104, 083107.
- Orientation of a Monolayer of Dipolar Molecules on Graphene from X-ray Absorption Spectroscopy. Phillip, J.; Haung, C.; Kim, M.; Safron, N.; Arnold, M.; Wong, B.; Gopalan, P.; Himpfel, F.; *Langmuir* **2014**, 30(9), 2559-2565.
- Two-Dimensional Sum-Frequency Generation Reveals Structure and Dynamics of a Surface-Bound Peptide. Laaser, J.; Skoff, D.; Ho, J.; Joo, Y.; Serrano, A.; Steinkruger, J.; Gopalan, P.; Gellman, S.; Zanni, M.; *J. Am. Chem. Soc.* **2014**, 136(3), 956-962.
- Raman Enhancement of a Dipolar Molecule on Graphene. Huang, C.; Kim, M.; Wong, B.M.; Safron, N.; Arnold, M.S.; Gopalan, P.; *J. Phys. Chem. C* **2014**, 118(4), 2077-2084.

2013

- Functionalization of Single-Wall Carbon Nanotubes with Chromophores of Opposite Internal Dipole Orientation" Zhao, Yuanchun; Huang, Changshui; Kim, Myungwoong; Wong, Bryan; Leonard, Francois; Gopalan, Padma; Eriksson, Mark; *Applied Materials and Interfaces*, **2013**, 5, 9355-9361.
- Interplay of Surface Chemical Composition and Film Thickness on Graphoepitaxial Assembly of Asymmetric Block Copolymers. Kim, M.; Han, E.; Sweat, D.; Gopalan, P. *Soft Matter* **2013**, 9, 6135-6141.
- A Dual Functional Layer for Block Copolymer Self-Assembly and the Growth of Nanopatterned Polymer Brushes" Sweat, Daniel; Kim, Myungwoong; Yu, Xiang; Schmitt, Samantha; Han, Eungnak; Choi, Jonathan; Gopalan, Padma (Accepted in *Langmuir* in September 2013)
- Bulk and Thin Film Morphological Behavior of Broad Dispersity Poly(styrene-b-methyl methacrylate) Diblock Copolymers. Widin, J. M.; Kim, M.; Schmitt, A. K.; Han, E.; Gopalan, P.; Mahanthappa, M. K. *Macromolecules* **2013**, 46(11), 4472-4480.
- Continuous Equilibrated Growth of Ordered Block Copolymer Thin Films by Electrospray Deposition. Hu, H.; Rangou, S.; Kim, M.; Gopalan, P.; Filiz, V.; Avgeropoulos, A.; Osuji, C. O. *ACS Nano* **2013**, 7(4), 2960-2970.
- Single Component Inimer Containing Cross-linkable Ultra-thin Polymer Coating for Dense Polymer Brush Growth. Sweat, D. P., Kim, M., Xiang, Y., Gopalan, P. *Langmuir* **2013**, 29(11), 3805-3812.
- Effects of Pulsing and Interfacial Potentials on Tellurium-Organic Heterostructured Films. Ireland, R.M., Dawidczyk, T.J., Cottingham, P., McQueen, T.M., Johns, G., Markovic, N., Zhang, L., Gopalan, P., Katz, H.E. *ACS Appl. Mater. Interfaces* **2013**, 5(5), 1604-1611.
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INVITED SHORT COURSES:

- Invited short course: As part of my stay at IISc, I developed the contents and gave a short course on "Directed Assembly of Block Copolymer Materials". This consisted of a series of 7 lectures with each lecture of 90 minutes duration. The audience for this course were undergraduate students majoring in Chemistry through an integrated Masters program at IISc and graduate students from IISc (organic chemistry, Inorganic and Physical Chemistry, Department of Materials Science and Engineering), as well as graduate students from a premier research institution in Bangalore namely the Jawaharlal Institute for Advanced Scientific Research (JNC)

PATENTS AND PATENT APPLICATIONS: 21 RECORDS TO DATE WHERE GOPALAN IS ONE OF THE INVENTORS

PAT: Patent; IP # starting with P are WARF internal reference numbers. Ones starting with US are issued US patents.

IP: IP Number	Title	Record Type	Status	Filing Date
U.S. Patent No. 10,100,163	SUBSTRATE INDEPENDENT COPOLYMERS FOR BIOFUNCTIONALIZATION	PAT	ISSUED	10/16/2018
U.S. Patent No. 9,207,536	PHOTOPATTERNABLE IMAGING LAYERS FOR CONTROLLING BLOCK COPOLYMER MICRODOMAIN ORIENTATION	PAT	ISSUED	12/08/2014
U.S. Patent No. 9,114,998	METHODS OF FABRICATING LARGE-AREA, SEMICONDUCTING NANOPERFORATED GRAPHENE MATERIALS	PAT	ISSUED	08/25/2015
U.S. Patent No. 10,252,914	NANOSTRUCTURED GRAPHENE WITH ATOMICALLY-SMOOTH EDGES	PAT	ISSUED	04/09/2019
U.S. Patent No. 9,388,268	PATTERNABLE POLYMER BLOCK BRUSH LAYERS	PAT	ISSUED	07/10/2016
U.S. Patent No. 9803292	BARRIER GUIDED GROWTH OF MICROSTRUCTURED AND NANOSTRUCTURED GRAPHENE AND GRAPHITE	PAT	FILED	10/31/2017
U.S. Patent No. 9105480	METHODS FOR THE FABRICATION OF GRAPHENE NANORIBBON ARRAYS USING BLOCK COPOLYMER LITHOGRAPHY	PAT	ISSUED	08/11/2015
U.S. Patent No. 9777185	AZLACTONE BASED THERMALLY CROSSLINKABLE POLYMER COATING FOR CONTROLLING CELL BEHAVIOR	PAT	ISSUED	10/3/2017
U.S. Patent No. 9097979	BLOCK COPOLYMER-BASED MASK STRUCTURES FOR THE GROWTH OF NANOPATTERNED POLYMER BRUSHES	PAT	FILED	3/13/2013
U.S. Patent No. 9115255	CROSSLINKED RANDOM COPOLYMER FILMS FOR BLOCK COPOLYMER DOMAIN ORIENTATION	PAT	ISSUED	08/25/2015
U. S. Patent No.	INIMER-CONTAINING RANDOM COPOLYMERS AND CROSSLINKED COPOLYMER FILMS FOR DENSE POLYMER BRUSH GROWTH	PAT	ISSUED	11/20/2016
U.S. Patent No. 8,999,623	DEGRADABLE NEUTRAL LAYERS FOR BLOCK COPOLYMER LITHOGRAPHY APPLICATIONS	PAT	ISSUED	04/07/2015
U.S. Patent 9938149	DEGRADABLE CONJUGATED POLYMER FOR SELECTIVE SORTING OF SEMICONDUCTING NANOTUBES	PAT	ISSUED	04/10/2018
U.S. Patent 9728734	ALIGNMENT OF CARBON NANOTUBES IN CONFINED CHANNELS	PAT	ISSUED	06/06/2017
U.S. Patent No. 9,425,405	CONTINUOUS, FLOATING EVAPORATIVE ASSEMBLY OF ALIGNED CARBON NANOTUBES	PAT	ISSUED	08/23/2016

US patent Number 9368723	DOSE-CONTROLLED, FLOATING EVAPORATIVE ASSEMBLY OF ALIGNED CARBON NANOTUBES FOR USE IN HIGH PERFORMANCE FIELD EFFECT TRANSISTORS	PAT	ISSUED	06/14/2016
U.S. Patent No. 9,786,853	FLOATING EVAPORATIVE ASSEMBLY OF ALIGNED CARBON NANOTUBES	PAT	ISSUED	10/10/2017
U.S. Patent 9587136	BLOCK COPOLYMERS WITH HIGH FLORY- HUGGINS INTERACTION PARAMETERS FOR BLOCK COPOLYMER LITHOGRAPHY	PAT	ISSUED	03/07/2017
P190109US01	FORMAMIDE MONOMERS AND POLYMERS	PAT	Filed	11/15/2018
P170037US01	REMOVABLE NON-CONJUGATED POLYMERS FOR DISPERSING CARBON NANOTUBES	PAT	Filed	1/5/2018
U.S. Patent No 9327979	METHODS FOR REMOVING POLYMER COATINGS FROM SINGLE-WALLED CARBON NANOTUBES	PAT	ISSUED	05/03/2016