

Aravind Vijayaraghavan
Academic (Teaching & Research) Professor
Materials Engineering



Qualifications

Ph.D. Rensselaer Polytechnic Institute, Advisor: Prof. Pulickel Ajayan, Rensselaer Polytechnic Institute
2002 → 2005

M.Eng. Ph.D. Rensselaer Polytechnic Institute, Advisor: Prof. Pulickel Ajayan, Rensselaer Polytechnic Institute
2000 → 2002

B.Tech Indian Institute of Technology - Madras, Indian Institute of Technology - Madras
1996 → 2000

Employment

Professor of Nanomaterials

Academic (Teaching & Research) Professor
Materials Engineering
The University of Manchester
1 Aug 2019 → present

Senior post-doctoral research associate

Massachusetts Institute of Technology
Cambridge, United States
1 Oct 2009 → 1 Sept 2010

Research output

Tuneable electrohydrodynamics of core-shell graphene oxide vortex rings

Shao, Y., Nie, K., Iliut, M., Box, F., Luan, D., Shen, Y., Wang, W., Sampson, W., Dierking, I. & Vijayaraghavan, A., 1 Apr 2023, In: Journal of Molecular Liquids.

Modelling graphene-polymer heterostructure MEMS membranes with the Föppl-von Kármán equations

Smith, K., Retallick, A., Melendrez Armada, D., Vijayaraghavan, A. & Heil, M., 2023, In: ACS Applied Materials and Interfaces .

Acidic and Basic Self-Assembling Peptide and Peptide-Graphene Oxide Hydrogels: Characterisation and Effect on Encapsulated Nucleus Pulposus Cells

Ligorio, C., Vijayaraghavan, A., Hoyland, J. & Saiani, A., 15 Apr 2022, In: Acta Biomaterialia. 143, p. 145-158

Biochemical Functionalization of Graphene Oxide for Directing Stem Cell Differentiation

Verre, A. F., Faroni, A., Iliut, M., Silva, C., Muryn, C., Reid, A. & Vijayaraghavan, A., 24 Sept 2021, (Accepted/In press) In: Journal of Molecular Structure.

TGF-β3-loaded Graphene Oxide - Self-assembling Peptide Hybrid Hydrogels as Functional 3D Scaffolds for the Regeneration of the Nucleus Pulposus

Ligorio, C., O'Brien, M., Hodson, N. W., Mironov, A., Iliut, M., Miller, A. F., Vijayaraghavan, A., Hoyland, J. A. & Saiani, A., 6 Apr 2021, In: Acta Biomaterialia.

Gas separation performance of MMMs containing (PIM-1)-functionalized GO derivatives

Luque-alled, J. M., Ameen, A., Alberto, M., Tamaddondar, M., Foster, A. B., Budd, P. M., Vijayaraghavan, A. & Gorgojo, P., 1 Apr 2021, In: Journal of Membrane Science. 623, p. 118902 118902.

Graphene Oxide Substrate Promotes Neurotrophic Factor Secretion and Survival of Human Schwann-Like Adipose Mesenchymal Stromal Cells

Llewellyn, S., Faroni, A., Iliut, M., Bartlam, C., Vijayaraghavan, A. & Reid, A., 4 Mar 2021, In: *Advanced Biology*.

Hybrid molecular/mineral lyotropic liquid crystal system of CTAB and graphene oxide in water

Shao, Y., Iliut, M., Dierking, I. & Vijayaraghavan, A., 1 Mar 2021, In: *Carbon*. p. 105-114

Fabrication and electrochemical response of pristine graphene ultramicroelectrodes

Goodwin, S., Coldrick, Z., Heeg, S., Grieve, B., Vijayaraghavan, A. & Hill, E. W., 26 Feb 2021, In: *Carbon*. 177, p. 207-215 9 p.

Development of an open-source thermally stabilized quartz crystal microbalance instrument for biomolecule-substrate binding assays on gold and graphene

Melendrez Armada, D., Hampitak, P., Jowitt, T., Iliut, M. & Vijayaraghavan, A., 2021, In: *Analytica Chimica Acta*.

High-grip and hard-wearing graphene reinforced polyurethane coatings

Alberto, M., Iliut, M., Pitchan, M. K., Behnsen, J. & Vijayaraghavan, A., 2021, In: *Composites. Part B: Engineering*.

Elastic flow instabilities and macroscopic textures in graphene oxide lyotropic liquid crystals

Wychowaniec, J., Iliut, M., Borek, B., Muryn, C., Mykhaylyk, O. O., Edmondson, S. & Vijayaraghavan, A., 26 Nov 2020, (Accepted/In press) In: *n p j 2D Materials and Applications*.

On the biocompatibility of graphene oxide towards vascular smooth muscle cells

Ren, J., Braileanu, G., Gorgojo, P., Valles, C., Dickinson, A., Vijayaraghavan, A. & Wang, T., 15 Oct 2020, (E-pub ahead of print) In: *Nanotechnology*.

A point-of-care immunosensor based on quartz crystal microbalance with graphene biointerface for antibody assay

Hampitak, P., Jowitt, T., Melendrez Armada, D., Fresquet, M., Hamilton, P., Iliut, M., Nie, K., Spencer, B., Lennon, R. & Vijayaraghavan, A., 2 Oct 2020, (Accepted/In press) In: *ACS Sensors*.

Protein interactions and conformations on graphene-based materials mapped using quartz-crystal microbalance with dissipation monitoring (QCM-D)

Hampitak, P., Melendrez Armada, D., Iliut, M., Fresquet, M., Parsons, N., Spencer, B., Jowitt, T. & Vijayaraghavan, A., 26 Apr 2020, (Accepted/In press) In: *Carbon*.

Graphene oxide containing self-assembling peptide hybrid hydrogels as a potential 3D injectable cell delivery platform for intervertebral disc repair applications.

Ligorio, C., Zhou, M., Wychowaniec, J., Zhu, X., Bartlam, C., Miller, A. F., Vijayaraghavan, A., Hoyland, J. & Saiani, A., 12 May 2019, In: *Acta Biomaterialia*. 92, p. 92-103

PVDF membranes containing reduced graphene oxide: effect of degree of reduction on membrane distillation performance

Abdel-karim, A., Luque-Alled, J. M., Leaper, S., Alberto, M., Fan, X., Vijayaraghavan, A., Gad-Allah, T. A., El-Kalliny, A. S., Szekely, G., Ahmed, S. I. A., Holmes, S. & Gorgojo, P., 15 Feb 2019, In: *Desalination*. 452, p. 196-207 11 p.

Initial Studies Directed toward the Rational Design of Aqueous Graphene Dispersants

Heard, K. W. J., Bartlam, C., Williams, C. D., Zhang, J., Alwattar, A. A., Little, M. S., Parry, A. V. S., Porter, F. M., Vincent, M. A., Hillier, I. H., Siperstein, F. R., Vijayaraghavan, A., Yeates, S. G. & Quayle, P., 31 Jan 2019, In: *ACS Omega*. 4, 1, p. 1969-1981 13 p.

Nanometre electron beam sculpting of suspended graphene and hexagonal boron nitride heterostructures

Clark, N., Lewis, E., Haigh, S. & Vijayaraghavan, A., 2019, In: *2D Materials*.

Polyethersulfone membranes: from ultrafiltration to nanofiltration via the incorporation of APTS functionalized-graphene oxide

Luque-Alled, J. M., Abdel-karim, A., Alberto, M., Leaper, S., Perez-page, M., Huang, K., Vijayaraghavan, A., El-kalliny, A. S., Holmes, S. M. & Gorgojo, P., 2019, In: Separation and Purification Technology. p. 115836

Resonant, Plasmonic Raman Enhancement of α -6T Molecules Encapsulated in Carbon Nanotubes

Wasserroth, S., Heeg, S., Mueller, N. S., Kusch, P., Huebner, U., Gaufres, E., Tang, N. Y., Martel, R., Vijayaraghavan, A. & Reich, S., 2019, In: The Journal of Physical Chemistry C.

Graphene oxide films for field effect surface passivation of silicon for solar cells

Vaqueiro-Contreras, M., Bartlam, C., Bonilla, R. S., Markevich, V. P., Halsall, M. P., Vijayaraghavan, A. & Peaker, A. R., 1 Dec 2018, In: Solar Energy Materials and Solar Cells. 187, p. 189-193 5 p.

Probing hotspots of plasmon-enhanced Raman scattering by nanomanipulation of carbon nanotubes

Heeg, S., Clark, N. & Vijayaraghavan, A., 16 Nov 2018, In: Nanotechnology. 29, 46, p. 465710

Study on the formation of thin film nanocomposite (TFN) membranes of polymers of intrinsic microporosity and graphene-like fillers: effect of lateral flake size and chemical functionalization

Alberto, M., Bhavsar, R., Luque-Alled, J. M., Prestat, E., Gao, L., Budd, M., Vijayaraghavan, A., Szekely, G., Holmes, S. & Gorgojo, P., 1 Nov 2018, In: Journal of Membrane Science. 565, p. 390-401

Nanoscale Infrared Identification and Mapping of Chemical Functional Groups on Graphene

Bartlam, C., Morsch, S., Heard, K., Quayle, P., Yeates, S. & Vijayaraghavan, A., Nov 2018, In: Carbon. 139

Impeded physical aging in PIM-1 membranes containing graphene-like fillers

Alberto, M., Bhavsar, R., Luque-Alled, J. M., Vijayaraghavan, A., Budd, P. & Gorgojo, P., 1 Oct 2018, In: Journal of Membrane Science. 563, p. 513-520 7 p.

Designing peptide / graphene hybrid hydrogels through fine tuning of molecular interactions

Wychowaniec, J., Iliut, M., Zhou, M., Moffat, J., Elsayy, M., Anacleto Pinheiro, W., Hoyland, J., Miller, A., Vijayaraghavan, A. & Saiani, A., 19 Apr 2018, In: Biomacromolecules. 19, 7, p. 2731-2741 11 p.

Adsorption and binding dynamics of graphene-supported phospholipid membranes using the QCM-D technique

Meléndrez Armada, D., Jowitt, T., Iliut, M., Verre, A. F., Goodwin, S. & Vijayaraghavan, A., 2018, In: Nanoscale.

Flux-enhanced PVDF mixed matrix membranes incorporating APTS-functionalized graphene oxide for membrane distillation

Leaper, S., Ahmed Abdelkarim, A., Faki, B., Luque-Alled, J. M., Alberto, M., Vijayaraghavan, A., Holmes, S., Szekely, G., Badawy, M. I., Shokri, N. & Gorgojo, P., 2018, In: Journal of Membrane Science.

Improving the glial differentiation of human Schwann-like adipose-derived stem cells with graphene oxide substrates

Verre, A. F., Faroni, A., Iliut, M., Silva, C., Muryn, C., Reid, A. & Vijayaraghavan, A., 2018, In: Interface Focus.

Ternary nanocomposites of reduced graphene oxide, polyaniline and hexaniobate: hierarchical architecture and high polaron formation

Silva, C. H. B., Iliut, M., Muryn, C., Berger, C., Coldrick, Z., Constantino, V. R. L., Temperini, M. L. A. & Vijayaraghavan, A., 2018, In: Beilstein Journal of Nanotechnology. 9, p. 2936-2946

Capacitive pressure sensing with suspended graphene-polymer heterostructure membranes

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Touch-mode capacitive pressure sensor with graphene-polymer heterostructure membrane

Berger, C., Phillips, R., Pasternak, I., Sobieski, J., Strupinski, W. & Vijayaraghavan, A., 30 Nov 2017, In: 2 D Materials.

Raman mapping analysis of graphene integrated silicon micro-ring resonators

Hussein, S. M. A., Crowe, I., Clark, N., Milosevic, M., Vijayaraghavan, A., Gardes, F. Y., Mashanovich, G. Z. & Halsall, M., 22 Nov 2017, In: *Nanoscale Research Letters*. 12, 200.

Evaluating arbitrary strain configurations and doping in graphene with Raman spectroscopy

Mueller, N. S., Heeg, S., Pena Alvarez, M., Kusch, P., Wasserroth, S., Clark, N., Schedin, B., Parthenios, J., Papagelis, K., Galiotis, C., Kalbac, M., Vijayaraghavan, A., Huebner, U., Gorbachev, R., Frank, O. & Reich, S., 6 Nov 2017, In: *2D Materials*. 5, 1, 015016.

High flux and fouling resistant flat sheet polyethersulfone membranes incorporated with graphene oxide for ultrafiltration applications

Leeper, S., Alberto, M., Vijayaraghavan, A., Holmes, S., Souaya, E. R., Badawy, M. I., Gorgojo, P. & Ahmed Abdelkarim, A., 16 Oct 2017, In: *Chemical Engineering Journal*. 334, p. 789-799 11 p.

Biomimetic Phospholipid Membrane Organization on Graphene and Graphene Oxide Surfaces: A Molecular Dynamics Simulation Study

Willems, N., Urtizberea, A., Verre, A. F., Iliut, M., Lelimosin, M., Hirtz, M., Vijayaraghavan, A. & Sansom, M. S. P., 6 Feb 2017, In: *ACS Nano*. 11, 2, p. 1613-1625 13 p.

Confinement effects on lyotropic nematic liquid crystal phases of graphene oxide dispersions

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Enhanced organophilic separations with mixed matrix membranes of polymers of intrinsic microporosity and graphene-like fillers

Alberto, M., Luque-Alled, J. M., Gao, L., Iliut, M., Prestat, E., Newman, L., Haigh, S., Vijayaraghavan, A., Budd, P. & Gorgojo, P., 2017, In: *Journal of Membrane Science*. 526

Plasmonic enhancement of SERS measured on molecules in carbon nanotubes

Mueller, N. S., Heeg, S., Kusch, P., Gaufres, E., Tang, N. Y. W., Hübner, U., Martel, R., Vijayaraghavan, A. & Reich, S., 2017, In: *Faraday Discussions*. 205, p. 85-103 19 p.

Attoliter Chemistry for Nano-Scale Functionalization of Graphene

Hirtz, M., Varey, S., Fuchs, H. & Vijayaraghavan, A., 14 Dec 2016, In: *ACS Applied Materials and Interfaces*. p. 33371-33376 6 p.

Properties of a Thermotropic Nematic Liquid Crystal Doped with Graphene Oxide

Al-Zangana, S., Iliut, M., Turner, M., Vijayaraghavan, A. & Dierking, I., Oct 2016, In: *Advanced Optical Materials*. 4, 10, p. 1541-1548 8 p.

Graphene and water-based elastomers thin-film composites by dip-moulding

Iliut, M., Silva, C., Herrick, S., McGlothlin, M. & Vijayaraghavan, A., Sept 2016, In: *Carbon*. 106, p. 228-232 5 p.

Dielectric spectroscopy of isotropic liquids and liquid crystal phases with dispersed graphene oxide

Al-Zangana, S., Iliut, M., Boran, G., Turner, M., Vijayaraghavan, A. & Dierking, I., 24 Aug 2016, In: *Scientific Reports*. 6, 31885.

Fabrication and modelling of fractal, biomimetic, micro and nano-topographical surfaces

Kyle, D., Oikonomou, A., Hill, E., Vijayaraghavan, A. & Bayat, A., 2016, In: *Bioinspiration & Biomimetics*. 11, 4, 046009.

Graphene Oxide promotes embryonic stem cell differentiation to haematopoietic lineage

Garcia Alegria, E., Iliut, M., Stefanska, M., Silva, C., Heeg, S., Kimber, S., Kouskoff, V., Lacaud, G., Vijayaraghavan, A. & Batta, K., 2016, In: *Scientific Reports*. 6, 25917.

Self-limiting Multiplexed Assembly of Lipid Membranes on Large-area Graphene Sensor Arrays

Hirtz, M., Oikonomou, A., Clark, N., Kim, Y. J., Fuchs, H. & Vijayaraghavan, A., 2016, In: *Nanoscale*. 8, p. 15147-15151 5 p.

Ultra-thin graphene-polymer heterostructure membranes

Berger, C., Dirschka, M. & Vijayaraghavan, A., 2016, In: *Nanoscale*.

Stokes and anti-Stokes Raman spectra of the high-energy C-C stretching modes in graphene and diamond

Jorio, A., Kasperczyk, M., Clark, N., Neu, E., Maletinsky, P., Vijayaraghavan, A. & Novotny, L., Nov 2015, In: *Physica Status Solidi. B: Basic Research*. 252, 11, p. 2380-2384 4 p.

Graphene oxide selectively targets cancer stem cells, across multiple tumor types: implications for non-toxic cancer treatment, via "differentiation-based nano-therapy".

Fiorillo, M., Verre, A. F., Iliut, M., Peiris Pages, M., Ozsvari, B., Gandara, R., Cappello, A. R., Sotgia, F., Vijayaraghavan, A. & Lisanti, M. P., 24 Feb 2015, In: *Oncotarget*. 6, 6, p. 3553-3562

Scalable bottom-up assembly of suspended carbon nanotube and graphene devices by dielectrophoresis

Oikonomou, A., Clark, N., Heeg, S., Kretinin, A., Varey, S., Yu, G. & Vijayaraghavan, A., 2015, In: *physica status solidi (RRL) – Rapid Research Letters*. 9999, 9999, p. 539-543 5 p.

Plasmon-enhanced Raman scattering by carbon nanotubes optically coupled with near-field cavities

Heeg, S., Oikonomou, A., Fernandez-Garcia, R., Lehmann, C., Maier, S. A., Vijayaraghavan, A. & Reich, S., 9 Apr 2014, In: *Nano Letters*. 14, 4, p. 1762-1768 6 p.

Determination of the quasi-TE mode (in-plane) graphene linear absorption coefficient via integration with silicon-on-insulator racetrack cavity resonators

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Engaging a wider audience.

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Multiplexed Biomimetic Lipid Membranes on Graphene by Dip-Pen Nanolithography

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Optical-Phonon Resonances with Saddle-Point Excitons in Twisted-Bilayer Graphene

Jorio, A., Kasperczyk, M., Clark, N., Neu, E., Maletinsky, P., Vijayaraghavan, A. & Novotny, L., 2014, In: *Nano Letters*. 14, 10, p. 5687-5692 6 p.

Plasmon-enhanced Raman scattering by suspended carbon nanotubes

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Polarized plasmonic enhancement by Au nanostructures probed through raman scattering of suspended graphene

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Bottom-up assembly of nano-carbon devices by dielectrophoresis

Vijayaraghavan, A., 2013, In: Physica Status Solidi (B) Basic Research. 250, p. 2505-2517 13 p.

Catalytic subsurface etching of nanoscale channels in graphite.

Lukas, M., Meded, V., Vijayaraghavan, A., Song, L., Ajayan, P. M., Fink, K., Wenzel, W. & Krupke, R., 2013, In: Nature Communications. 4, p. 1379

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Directed self-assembly of block copolymers for use in bit patterned media fabrication

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Self assembled monolayers (SAMs) on metallic surfaces (gold and graphene) for electronic applications

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Applications of chirality-sorted individual single-wall carbon nanotube devices

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Growth, dispersion, and electronic devices of nitrogen-doped single-wall carbon nanotubes

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Bi- and trilayer graphene solutions

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A scalable, CMOS-compatible assembly of ambipolar semiconducting single-walled carbon nanotube devices.

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Graphene sensors

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Hydrogen sensing with diameter- and chirality-sorted carbon nanotubes.

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Imaging conduction pathways in carbon nanotube network transistors by voltage-contrast scanning electron microscopy

Vijayaraghavan, A., Timmermans, M. Y., Grigoras, K., Nasibulin, A. G., Kauppinen, E. I. & Krupke, R., 2011, In: Nanotechnology. 22, 26, 265715.

High purity graphenes prepared by a chemical intercalation method

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Imaging defects and junctions in single-walled carbon nanotubes by voltage-contrast scanning electron microscopy

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Synthesis of Atomically Thin WO₃ Sheets from Hydrated Tungsten Trioxide

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Dielectrophoretic Assembly of High-Density Arrays of Individual Graphene Devices for Rapid Screening

Vijayaraghavan, A., Sciascia, C., Dehm, S., Lombardo, A., Bonetti, A., Ferrari, A. C. & Krupke, R., 2009, In: ACS Nano. 3, 7, p. 1729-1734 6 p.

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Ultra-large-scale directed assembly of single-walled carbon nanotube devices

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Mechanism of metal-semiconductor transition in electric properties of single-walled carbon nanotubes induced by low-energy electron irradiation

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Activities