

## ***Curriculum Vitae***

***Name:*** K. S. NARAYAN



***Institution:*** Jawaharlal Nehru Centre for Advanced Scientific Research, (JNCASR), Jakkur  
Bangalore 560064, Tel: 91-80-22082822, Fax: 91-80-22082766, email: narayan@jncasr.ac.in

***Present Position:*** Professor and JC Bose National Fellow

### ***Academic Background:***

| Degree          | Year        | University/Institute      |
|-----------------|-------------|---------------------------|
| M.Sc. (Physics) | 1986 (June) | IIT, Bombay               |
| M.S., Ph.D      | 1991 (Dec.) | The Ohio State University |

PhD Research Thesis : Phase Transitions in Low Dimensional Molecular Magnets  
Supervisor: Prof. A. J. Epstein

### ***Details of Employment Professional Training and Research experience***

|                       |                           |  |   |
|-----------------------|---------------------------|--|---|
| Teaching Associate    | 1986-1988                 | Physics Department                             | The Ohio State Univ. USA                    |
| Research Associate    | 1988-1991                 | Physics Department                             | The Ohio State Univ. USA                    |
| Research Scientist    | 1992-1994                 | Polymer Branch/ML                              | Wright Patterson Air Force Base, Dayton, OH |
| Adjunct Faculty       | 1993-1994                 | Physics Department                             | Wright State Univ., OH, USA                 |
| Faculty Fellow        | 1994-2000                 | Chemistry and Physics of materials unit (CPMU) | JNCASR, Bangalore India                     |
| Associate Professor   | 2000-2006                 | CPMU, JNCASR                                   |   |
| Professor             | 2006-Present              | CPMU, JNCASR                                   |   |
| Dean (Academic)       | 2005-2008                 | JNCASR   |   |
| Dean (R&D)            | 2011-2019                 | JNCASR   |   |
| President (In-Charge) | 2013-2015<br>2019-2020Feb | JNCASR   |   |

### ***Visiting Positions***

|                           |           |   |
|---------------------------|-----------|---|
| Visiting Faculty          | 2000 Jan. | Physics Dept., Technion, Haifa, Israel              |
| Visiting Faculty          | 2002 Sum. | Physics Dept., Ohio State University                |
| Visiting Assoc. Professor | 2003 Sum. | Mat. Sci. and Eng. Dept., Univ. of Michigan         |
| Distinguished Scientist   | 2005 Sum. | Embedded and Physical Systems, Motorola R&D Arizona |
| Visiting Faculty          | 2009 Sum. | Ecole Normal Supérieure, Cachan, France             |
| Visiting Faculty          | 2010 Sum. | Northwestern Univ. USA                              |

### ***Other Professional Engagements***

Member, Research Advisory Council, NPL N.Delhi (2022-2025)  
Past Member, Council of Management and Academic Advisory Council, JNCASR  
Past Member, Governing board, INST, Mohali (2017-2021)  
Coordinator of Technical Research Centre, JNCASR (2016-2021)  
Expert Review Committee member of TRC, ARCI Hyderabad (2022-2027)  
Chair, Sectional Committee-Physics Indian Academy of Science Bangalore (2018-2021)  
Chair for the Working group on Physics in Industry of IUPAP (International Union for Pure and Applied Physics) (2019-2021)

International Committee Member of ICSM conference series  
Editorial Board Member for Materials Horizon–RSC(UK), ACS Applied Electronic Materials  
Member of Department of Science and Technology, Government of India, FIST Advisory Board,  
and Inspire Faculty Selection (Material Sciences) Committee  
Board Member of IITACB and CSTEP

**Number of Students Guided for PhD Thesis: 22**

**Number of Students Guided for MS Thesis: 9**

**Professional Recognition, Awards, Fellowships Received**

- Fellow of Indian National Science Academy, India
- Fellow of National Academy of Sciences, India
- Fellow of Indian Academy of Sciences, India
- JC Bose Fellowship, DST India
- Silver Jubilee Professor JNCASR
- National Prize for Research in Energy Materials and Devices
- IEEE Senior Member and EDS-Distinguished Lecturer
- Awarded the Materials Science Prize Medal of the Materials Research Society of India, 2008
- Invited Speaker at International Conferences: (APS, MRS, ICSM, OP, IEEE)
- DAE-Outstanding Research Investigator Award – 2009-2014
- Awarded the Materials Research Society of India medal for 1997

**Co-Founder of Startup:** *hbaromega (h̄ω) Pvt. Ltd.- A Photovoltaic diagnostic Company*

**Co-Ordinator of Technical Research Centre at JNCASR (2015-2020)** A Department of Science and Technology Initiative to Translate Academic Inventions to Commercial Space

**Patents**

1. U.S. Patent No. 6,992,322: "Light Responsive Polymer based field effect transistor"
2. US Patent 9,037,251, European Patent EP-2585015 "Artificial Retina Device"
3. CN 103179928 B, "Artificial Retina Device"
4. US 9322713 B2, "Bulk heterojunction/electrolyte polymers as novel biocompatible photoactive multi color-sensing technology"
5. IN 329957 "A Method of forming a photo voltaic cell"
6. Organic Solar Cells and Methods thereof (European Patent Application No. 12812359).
7. Method And System To Assess Solar Cells (App. No. 201841020900, PCT/IB2018/056731)
8. 3D-Microfluidic Device for Cell culture and Biomedical application (Provisional Application)

**Publication Statistics:** Number of Papers ~ 160, Number of Citations > 5000

### List of Publications

(up to date list available on Google Scholar )

- [Light Controlled Signaling Initiated by Subretinal Semiconducting-Polymer Layer in Developing-Blind-Retina Mimics the Response of the Neonatal Retina](#), C.S. Deepak, Abhijith Krishnan, K.S. Narayan *J. Neural Eng. (to appear)* 2022
- [Insights into the charge carrier dynamics in perovskite/Si tandem solar cells using transient photocurrent spectroscopy](#) Anaranya Ghorai, Prashant Kumar, Suhas Mahesh, Yen-Hung Lin, Henry Snaith, and K S Narayan, *Applied Physics Letters* (120 (17), 173504) 2022
- [Visualization of carrier transport in lateral metal-perovskite-metal structures and its influence on device operation](#) N. Ganesh, A. Z. Ashar, Sumukh Purohit, K. L. Narasimhan, and K.S. Narayan *Physical Review Applied*, 17 (2), 024060 2022
- [Confinement highlights the different electrical transport mechanisms prevailing in conducting polymers](#) S Das, A Kumar, KS Narayan *Physical Review Materials* 6 (2), 025602 2022
- [Strategy for enhancing performance of organic ferroelectric memristors](#) R Vijayan, SS Behera, KS Narayan *Materials Research Bulletin* 145, 111536 2022
- [2D Position-Sensitive Hybrid-Perovskite Detectors](#) N Ganesh, K Schutt, PK Nayak, HJ Snaith, KS Narayan *ACS Applied Materials & Interfaces* 13 (45), 54527-54535 2021
- [High-Speed Laser Beam Induced Current Imaging: A Complementary Quantitative Diagnostic Tool for Modules](#) P Kumar, I Ghosekar, KS Narayan *IEEE Journal of Photovoltaics* 11 (6), 1436-1445 2021
- [Impact of trap filling on carrier diffusion in single crystals](#) N Ganesh, A Ghorai, S Krishnamurthy, S Banerjee, KL Narasimhan, S.Ogale and K.S. Narayan *Physical Review Materials* 4 (8), 084602 2020
- [Enhanced device performance via interfacial engineering in non-fullerene acceptor based organic solar cells](#) A Azeez, KS Narayan *Applied Physics Letters* 117 (4), 043302 2020
- [An integrated 3D-fluidic device with bubble guidance mechanism for long-term primary and secondary cell recordings on multielectrode array platform](#) Anil Krishna Konduri, C S Deepak, Sumukh Anil Purohit and K.S. Narayan DOI:10.1088/1758-5090/aba500 *Biofabrication* 2020
- [Toward reliable high performing organic solar cells: Molecules, processing, and monitoring](#) R Vijayan, A Azeez, KS Narayan *APL Materials* 8 (4), 040908 2020

- [Red-Emitting Delayed Fluorescence and Room Temperature Phosphorescence from Core-Substituted Naphthalene Diimides](#) 2019  
S Kuila, A Ghorai, PK Samanta, RBK Siram, SK Pati, KS Narayan, ...  
Chemistry–A European Journal 25 (70), 16007-16011
- [Photovoltaics: Materials and Devices](#) KS Narayan  
Advances In The Chemistry And Physics Of Materials: Overview Of Selected ... 2019
- [Wavelength-Dependent Charge Carrier Dynamics for Single Pixel Color Sensing Using Graded Perovskite Structures](#) N Ganesh, R Shivanna, RH Friend, KS Narayan 2019  
Nano letters 19 (9), 6577-6584
- [Corrigendum: Mixed-Stack Charge Transfer Crystals of Pillar \[5\] quinone and Tetrathiafulvalene Exhibiting Ferroelectric Features](#) KI Shivakumar, K Swathi, TC Das, A Kumar, RD Makde, K Vanka, K.S.Narayan, G.J. Sanjayan Chemistry–A European Journal 25 (35), 8425-8425 2019
- [Electrospun Fibers Containing Emissive Hybrid Perovskite Quantum Dots](#) P Kumar, N Ganesh, KS Narayan, ACS applied materials & interfaces 11 (27), 24468-24477 2019
- [Enhanced Stability and Optimized Morphology Induced by Electric-Field-Assisted Annealing of Bulk Heterojunction Solar Cells](#), R Vijayan, A Azeez, KS Narayan 2019  
Solar RRL 1900120
- [Significant Increase in Electrical Transport of Conducting Polymers Confined in Alumina Nanopores](#) S Das, KS Narayan, The Journal of Physical Chemistry C 123 (17), 11284-11291 2019
- [A Solution Processed Ultrathin Molecular Dielectric for Organic Field-Effect Transistors](#) K Swathi, V Murugesan, K Bhattacharyya, TK Mukhopadhyay, A Datta, ... 2019  
ACS Applied Electronic Materials 1 (4), 485-493
- [Melanin incorporated electroactive and antioxidant silk fibroin nanofibrous scaffolds for nerve tissue engineering](#) M Nune, S Manchineella, T Govindaraju, KS Narayan 2019  
Materials Science and Engineering: C 94, 17-25
- [Noncontact Electrical Probe for Monitoring Cellular Processes in Primary Retinal Explants](#) S.Purohit, CS Deepak S Nisha KS Narayan, Advanced Materials Technologies 1800564, 1-7 2018
- [An analysis of the factors determining the efficiency of photocurrent generation in polymer: nonfullerene acceptor solar cells](#) H Cha, CH Tan, J Wu, Y Dong, W Zhang, H Chen, S Rajaram, K.S.Narayan, J. Durrant Advanced Energy Materials 8 (32), 1801537 2018
- [Role of Charge-Transfer State in Perylene-Based Organic Solar Cells](#) R Shivanna, S Rajaram, KS Narayan ChemistrySelect 3 (32), 9204-9210 2018
- [Self-powered single semiconductor nanowire photodetector](#) S Sett, S Sengupta, N Ganesh, KS Narayan, AK Raychaudhuri Nanotechnology 29 (44), 445202 2018
- [Supramolecular complexes of poly \(3-Hexylthiophene\)-block \(and random\)-poly \[3-\(2-\(6-carboxyhexyl\) methyl\) thiophene\] copolymers with perylene bisimide](#) 2018  
S Shinde, R Vijayan, KS Narayan, SK Asha Journal of Polymer Science Part A: Polymer Chemistry 56 (14), 1574-1583
- [Self-Assembled Photochromic Molecular Dipoles for High-Performance Polymer Thin-Film Transistors](#) SP Senanayak, VK Sangwan, JJ McMorro, K Everaerts, Z 2018

Chen, M. Hersam, T.J. Marks, K.S. Narayan, ACS applied materials & interfaces 10 (25), 21492-21498

[Understanding the adhesion and optical properties of eutectic metal alloys for solution-processed electronics](#) P Kumar, S Aggarwal, C Narayana, KS Narayan 2018  
Journal of Applied Physics 123 (8), 083104

[Sensors: Hybrid Perovskite-Based Position-Sensitive Detectors \(Adv. Electron. Mater. 2/2018\)](#) 2018  
AZ Ashar, N Ganesh, KS Narayan  
Advanced Electronic Materials 4 (2), 1870012

[Hybrid Perovskite-Based Position-Sensitive Detectors](#) 2018  
AZ Ashar, N Ganesh, KS Narayan  
Advanced Electronic Materials 4 (2), 1700362

[Insights Into the Microscopic and Degradation Processes in Hybrid Perovskite Solar Cells Using Noise Spectroscopy](#) 2018  
A Singh, PK Nayak, S Banerjee, Z Wang, JTW Wang, HJ Snaith, ...  
Solar RRL 2 (1), 1700173

[Self-Assembled Porous Alumina Based Organic Nanotriode Arrays](#) 2017  
K Swathi, KS Narayan  
Nano letters 17 (12), 7945-7950

[Influence of non-line of sight luminescent emitters in visible light communication systems](#) 2017  
A Ghorai, P Walvekar, S Nayak, KS Narayan  
Journal of Optics 20 (1), 015703

[Mixed-Stack Charge Transfer Crystals of Pillar \[5\] quinone and Tetrathiafulvalene Exhibiting Ferroelectric Features](#) 2017  
KI Shivakumar, K Swathi, TC Das, A Kumar, RD Makde, K Vanka, ...  
Chemistry–A European Journal 23 (51), 12630-12635

[Facile Fabrication of Ultra-Stretchable Metallic Nanocluster Films for Wearable Electronics](#) 2017  
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[Synergistic Effects of Electric-Field-Assisted Annealing and Thermal Annealing in Bulk-Heterojunction Solar Cells](#) 2017  
R Vijayan, K Swathi, KS Narayan  
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[Electric field induced ferroelectric-surface modification for high mobility organic field effect transistors](#) 2017  
AZ Ashar, KS Narayan  
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[Photocurrent imaging of phase segregation in a ternary polymer blend induced via a non-solvent route](#) 2017  
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[Kinetic Control of Perovskite Thin-Film Morphology and Application in Printable Light-Emitting Diodes](#) 2017  
P Kumar, B Zhao, RH Friend, A Sadhanala, KS Narayan  
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[Microscopic and Degradation Processes in Hybrid Perovskite Solar Cells Using Noise Spectroscopy](#) 2017

A. Singh, P. K. Nayak, S. Banerjee, Z. Wang, H.Snaith, KS Narayan  
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[Multifunctional geometrical isomers of ferrocene-benzo \[1, 2-b: 4, 5-b'\] difuran-2, 6-\(3 H, 7 H\)-dione adducts: second-order nonlinear optical behaviour and charge transport ...](#) 2017  
P Singla, NV Steerteghem, N Kaur, AZ Ashar, P Kaur, K Clays, KS Narayan K Singh  
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[Image pixel device using integrated organic electronic components](#) 2016  
K Swathi, KS Narayan  
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[Solution processed integrated pixel element for an imaging device](#) 2016  
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[Quantum confinement effects in organic lead tribromide perovskite nanoparticles](#) 2016  
P Kumar, C Muthu, VC Nair, KS Narayan  
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[Multi-stimuli-responsive charge-transfer hydrogel for room-temperature organic ferroelectric thin-film devices](#) 2016  
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[Molecular architectonics of naphthalenediimides for efficient structure–property correlation](#) 2016  
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[Tuning the HOMO energy levels in quinoline and biquinoline based donor-acceptor polymers](#) 2016  
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[Self-Assembled Nanodielectrics for High-Speed, Low-Voltage Solution-Processed Polymer Logic Circuits](#) 2015  
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[Noise spectroscopy of polymer transistors](#) 2015  
R Harsh, KS Narayan  
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[Charge versus Energy Transfer Effects in High-Performance Perylene Diimide Photovoltaic Blend Films](#) 2015  
PEK Ranbir Singh, Ravichandran Shivanna, Agathaggelos Iosifidis, Hans-Jürgen ...  
ACS Applied Materials & Interfaces

[Dipole-moment-driven cooperative supramolecular polymerization](#) 2015  
C Kulkarni, KK Bejagam, SP Senanayak, KS Narayan, ...  
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[Interface engineering for efficient fullerene-free organic solar cells](#) 2015  
R Shivanna, S Rajaram, KS Narayan  
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[Room-temperature bandlike transport and Hall effect in a high-mobility ambipolar polymer](#) 2015  
SP Senanayak, AZ Ashar, C Kanimozhi, S Patil, KS Narayan  
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[Impact of wind correlation and load correlation on probabilistic load flow of radial distribution systems](#) 2015  
 KS Narayan, A Kumar  
 2015 IEEE International Conference on Signal Processing, Informatics ...

[Organic solar cell and methods thereof](#) 2015  
 KS Narayan, AJ Das  
 US Patent App. 14/388,056

[Studies of long-lived photogenerated carriers in low band gap polymer photodiodes](#) 2015  
 M Bag, KS Narayan  
 arXiv preprint arXiv:1502.03667

[Ferroelectric polymer matrix for probing molecular organization in perylene diimides](#) 2015  
 KV Chellappan, SK Kandappa, S Rajaram, KS Narayan  
 The journal of physical chemistry letters 6 (2), 224-229

[Modulation of electronic and self-assembly properties of a donor-acceptor-donor-based molecular materials via atomistic approach](#) 2015  
 J Dhar, K Swathi, DP Karothu, KS Narayan, S Patil  
 ACS applied materials & interfaces 7 (1), 670-681

[Artificial retina device](#) 2015  
 MB Kavassery Sureswaran Narayan, Vini Gautam  
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[A Comparison of Charge Separation Dynamics in Organic Blend Films Employing Fullerene and Perylene Diimide Electron Acceptors](#) 2015  
 JRD Safa, Shoaee, Florent Deledalle, Pabitra Shakya Tuladhar, Ravichandran ...  
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[Organic photovoltaics: key photophysical, device and design aspects](#) 2014  
 D Joshi, R Shivanna, KS Narayan  
 Journal of Modern Optics 61 (21), 1703-1713

[Nanostructured donor-acceptor self assembly with improved photoconductivity](#) 2014  
 B Saibal, AZ Ashar, RN Devi, KS Narayan, SK Asha  
 ACS applied materials & interfaces 6 (21), 19434-19448

[Improved performance of solution-processed n-type organic field-effect transistors by regulating the intermolecular interactions and crystalline domains on macroscopic scale](#) 2014  
 S Vasimalla, SP Senanayak, M Sharma, KS Narayan, PK Iyer  
 Chemistry of Materials 26 (13), 4030-4037

[Cu doping in ligand free CdS nanocrystals: conductivity and electronic structure study](#) 2014  
 GK Grandhi, K Swathi, KS Narayan, R Viswanatha  
 The journal of physical chemistry letters 5 (13), 2382-2389

[Luminescent polymer films from simple processing of coronene and europium precursors in water](#) 2014  
 M Planells, E Klampaftis, M Congiu, R Shivanna, KV Rao, O Chepelin, ...  
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[Zn \(II\) and Cu \(II\) complexes of a new thiophene-based salphen-type ligand: solution-processable high-performance field-effect transistor materials](#) 2014  
 AK Asatkar, SP Senanayak, A Bedi, S Panda, KS Narayan, SS Zade  
 Chemical Communications 50 (53), 7036-7039

[Strategies for Fast-Switching in All-Polymer Field Effect Transistors](#) 2014  
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 Advanced Functional Materials 24 (22), 3324-3331



- [Fabrication of single Si nanowire metal–semiconductor–metal device for photodetection](#) 2014  
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IEEE Transactions on Electron Devices 61 (5), 1444-1450
- [Naphthalene Diimide Copolymers with Oligo\(\*p\*-phenylenevinylene\) and Benzobisoxazole for Balanced Ambipolar Charge Transport](#) 2014  
NB Kolhe, AZ Ashar, KS Narayan, SK Asha  
Macromolecules 47 (7), 2296-2305
- [Photoconductive NSOM for mapping optoelectronic phases in nanostructures](#) 2014  
AJ Das, R Shivanna, KS Narayan  
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- [Single CuTCNQ charge transfer complex nanowire as ultra high responsivity photo-detector](#) 2014  
R Basori, K Das, P Kumar, KS Narayan, AK Raychaudhuri  
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- [A polymer optoelectronic interface provides visual cues to a blind retina](#) 2014  
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- [Supramolecular P4VP-pentadecylphenol naphthalenebisimide comb-polymer: mesoscopic organization and charge transport properties](#) 2014  
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- [Polymer optoelectronic structures for retinal prosthesis](#) 2014  
V Gautam, KS Narayan  
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- [Morphology and electrostatics play active role in neuronal differentiation processes on flexible conducting substrates](#) 2014  
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- [Charge generation and transport in efficient organic bulk heterojunction solar cells with a perylene acceptor](#) 2014  
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- [Solution processable benzooxadiazole and benzothiadiazole based DAD molecules with chalcogenophene: field effect transistor study and structure property relationship](#) 2013  
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- [Enhanced mobility and environmental stability in all organic field-effect transistors: The role of high dipole moment solvent](#) 2013  
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- [Hybrid n-GaN and polymer interfaces: Model systems for tunable photodiodes](#) 2013  
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- [Near-unity quantum yield in semiconducting nanostructures: structural understanding leading to energy efficient applications](#) 2013  
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- [Synthesis and characterization of copolymers based on cyclopenta \[c\] thiophene and bithiazole and their transistor properties](#) 2013  
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- [Neuronal differentiation of embryonic stem cell derived neuronal progenitors can be regulated by stretchable conducting polymers](#) 2013  
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- [Synthesis of Solution-Processable Poly\(cyclopenta\[c\]selenylvinylene\) and Its Charge Transport Properties: Comparative Study with the Thiophene Analogue](#) 2013  
A Bedi, SP Senanayak, KS Narayan, SS Zade  
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- [Self-Assembly of  \$\pi\$ -Conjugated Amphiphiles: Free Standing, Ordered Sheets with Enhanced Mobility](#) 2013  
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- [Nanostructured Crystalline Comb Polymer of Perylenebisimide by Directed Self-Assembly: Poly \(4-vinylpyridine\)-pentadecylphenol Perylenebisimide](#) 2013  
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- [Retention of Power Conversion Efficiency–From Small Area to Large Area Polymer Solar Cells \(Adv. Mater. 15/2013\)](#) 2013  
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- [Retention of power conversion efficiency–from small area to large area polymer solar cells](#) 2013  
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- [Large photoresponse of Cu: 7, 7, 8, 8-tetracyanoquinodimethane nanowire arrays formed as aligned nanobridges](#) 2013  
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- [Organic/Polymeric Systems: Candidates for Optoelectronic Devices](#) 2013  
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- [High-resolution photocurrent imaging of bulk heterojunction solar cells](#) 2013  
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- [Confinement induced stochastic sensing of charged coronene and perylene aggregates in  \$\alpha\$ -hemolysin nanochannels](#) 2013  
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- [Nonplanar perylene diimides as potential alternatives to fullerenes in organic solar cells](#) 2012  
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- [Fluctuations in photocurrent of bulk heterojunction polymer solar cells—A valuable tool to understand microscopic and degradation processes](#) 2012  
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S Mukhopadhyay, KS Narayan  
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- [Polarization fluctuation dominated electrical transport processes of polymer-based ferroelectric field effect transistors](#) 2012  
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- [Photocurrent noise in organic bulk heterojunction solar cells](#) 2012  
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S P Senanayak, S Guha, KS Narayan  
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- [Cyclopenta \[c\] thiophene oligomers based solution processable D–A copolymers and their application as FET materials](#) 2012  
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- [Single-pixel, single-layer polymer device as a tricolor sensor with signals mimicking natural photoreceptors](#) 2011  
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V Bommisetty 2011  
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