

# Oomman K. Varghese

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## EDUCATION

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**Ph.D., Physics**, Indian Institute of Technology (I.I.T.) Delhi, India, May 2001  
**M.Sc., Physics**, Mahatma Gandhi University, Kerala, India, 1991  
**B.Sc., Physics**, Mahatma Gandhi University, Kerala, India, 1989

## PROFESSIONAL EXPERIENCE

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2012- Present Associate Professor, Department of Physics, University of Houston, Houston, Texas  
2011-2012 Development Engineer, First Solar, Perrysburg, Ohio.  
2007-2010 Chief Scientist, Sentech Corporation, Boalsburg, PA  
2001-2011 Visiting Scientist/Research Associate/Post Doctoral Scholar, Materials Research Institute, The Pennsylvania State University, University Park, PA  
2000-2001 Post Doctoral Fellow, Department of Electrical Engineering, University of Kentucky, Lexington, KY  
1998-2000 Project Scientist, Department of Physics, Indian Institute of Technology Delhi, India.  
1994-1998 Senior/Junior Research Fellow, Department of Physics, Indian Institute of Technology, Delhi, India.  
1992-1994 Research Fellow, Dr. George Sudarshan Center for Physics and Computer Science, Mahatma Gandhi University, Kerala, India

## RECOGNITIONS AND FELLOWSHIPS

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- Ranked 9<sup>th</sup> in the Thomson Reuters' list of World's top 100 Materials Scientists in the past decade (selected based on citation impact scores of journal publications)
- Nominated for 2011 Eni International award in 'New Frontiers of Hydrocarbons'
- Listed in *Who's who in America (2007 – 2012)*, *Who's Who in the World (2008)* and *Who's Who in Science and Engineering (2008)*, Marquis Publishing, NJ
- University Grants Commission (UGC) and Council of Scientific and Industrial Research (CSIR), India, Lectureship, 1997
- Council of Scientific and Industrial Research (CSIR), India, Senior Research Fellowship, 1997
- Indian Institute of Technology Delhi, India, Junior Research Fellowship, 1994

## SYNERGISTIC ACTIVITIES

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- Member, Editorial Board, SRX Chemistry, Hindawi Publishing (2010- 2011).
- Member, Editorial Board, SRX Materials Science, Hindawi Publishing (2010-2011).
- Member, Editorial Board, Sensor Letters, American Scientific Publishing (2003-2007)
- Member, International Advisory Board, Encyclopedia of Sensors, American Scientific Publishers (2005)
- Reviewer for a number of journals and funding agencies

## TEACHING

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- Guest teacher for graduate course EE597G and under graduate course EE497G (Direct Solar Energy Conversion to Electricity and Fuel) offered by Electrical Engineering Department, The Pennsylvania State University, PA (2009)

- Laboratory course PH 130 (Experiments in Electricity and Magnetism) offered by Department of Physics, Indian Institute of Technology Delhi, India (1995-1997)
- Guest Lecturer, Department of Physics, C.M.S. College, Kottayam, India (1992-1994)

## **PATENTS**

High-Yield Visible Light Photocatalytic Conversion of CO<sub>2</sub> to Hydrocarbons, **O.K. Varghese**, M. Paulose and C.A. Grimes, US & European patents pending

Fabrication of Highly-ordered TiO<sub>2</sub> nanotube-arrays of great length, M. Paulose, S. Yoria, K. Shankar, **O.K. Varghese** and C.A. Grimes, US patent pending

Titania nanotube arrays for use as sensors and method of producing, **O.K. Varghese**, G.K. Mor. M. Paulose and C.A. Grimes, US patent # 7,011,737 B2

## **BOOK AND BOOK CHAPTER**

Light, Water, Hydrogen: The Solar Generation of Hydrogen by Water Photoelectrolysis, C.A. Grimes, O.K. Varghese and S. Ranjan, Springer Press, ISBN 978-0-387-33198-0

Metal Oxide Nanostructures as Gas Sensors, O.K. Varghese and C.A. Grimes, A chapter in Encyclopedia of Nanoscience and Nanotechnology, Edited by H.S. Chawla, American Scientific Publishers, Los Angeles, USA, **5**, 499-515 (2004)

## **PEER REVIEWED JOURNAL PUBLICATIONS (Selected from about 85)**

Long Vertically Aligned Titania Nanotubes on Transparent Conducting Oxide for Highly Efficient Solar Cells, **O.K. Varghese**, M. Paulose and C.A. Grimes, *Nature Nanotech.*, **4**, 592-597 (2009)

High-rate solar photocatalytic conversion of CO<sub>2</sub> and water vapor to hydrocarbon fuels, **O.K. Varghese**, M. Paulose, T.J. La Tempa and C.A. Grimes, *Nano Lett.*, **9**, 731-737 (2009)

Appropriate strategies for determining the photoconversion efficiency of water photoelectrolysis cells: A review with examples using titania nanotube array photoanodes, **O.K. Varghese** and C.A. Grimes, *Sol. Energ. Mat. Sol. Cells*, **92**, 374-384 (2008)

High efficiency double heterojunction polymer photovoltaic cells using highly ordered TiO<sub>2</sub> nanotube arrays, G.K. Mor, K. Shankar, M. Paulose, **O.K. Varghese** and C.A. Grimes, *Appl. Phys. Lett.*, **91**, 152111 (2007)

Water-photoelectrolysis properties of highly-ordered titania nanotube-arrays, **O.K. Varghese**, M. Paulose, K. Shankar, G.K. Mor and C.A. Grimes, *J. Nanosci. Nanotechnol.*, **5**, 1158 – 1165 (2005)

Extreme Changes in the electrical resistance of titania nanotubes with hydrogen exposure, **O.K. Varghese**, D. Gong, M. Paulose, K.G. Ong, E.C. Dickey and C.A. Grimes, *Adv. Mater.*, **15**, 624-627 (2003)

Gas sensing Characteristics of Multi-wall carbon nanotubes, **O.K. Varghese**, P.D. Kichambre, D. Gong, E.C. Dickey and C.A. Grimes, *Sens. Actuators B*, **81**, 32-41 (2000)

Studies of Ambient Dependent Electrical Behavior of Nano-Crystalline SnO<sub>2</sub> thin films using impedance spectroscopy, **O.K. Varghese** and L.K. Malhotra, *J. Appl. Phys.*, **87**, 7457-7465 (2000)

## **INVITED TALKS (selected)**

Excitonic Solar Cell Technologies Based on Transparent Films of Vertically Aligned Titania Nanotubes, **O.K. Varghese**, *International Conference on Solar Energy Photovoltaic (ICSEP 2012)*, Bhubaneswar, India, December 19-21, 2012

Nano-scale Materials for Advanced Photovoltaics, **O.K. Varghese**, *BIT's 2<sup>nd</sup> Annual World Congress of Nanoscience and Nanotechnology 2012*, Qingdao, China, October 26-28, 2012

Oxide Semiconductor Nanostructures for Excitonic solar cells, **O.K. Varghese**, *12<sup>th</sup> International Conference on Clean Energy (ICCE 2012)*, Xi'an, China, October, 27-29, 2012

Hydrogen Production and Storage (three lectures), **O.K. Varghese**, *Ph.D. Network Workshop on 'Materials for Energy'*, Ameland, Netherlands, June 19-14, 2011

Nanostructured Metal Oxide Semiconductor Gas Sensors, **O.K. Varghese**, *EPRI-ONAMI Workshop #2 on Advancements in Nanotechnology*, Electrical Power Research Institute, Charlotte, North Carolina, USA, June 22-23, 2011.

Solar Energy Conversion and Environmental Sensing Using Metal Oxide Nano-Architectures: Titania Nanotube Array Performance Highlights, **O.K. Varghese**, *Nanotech India 2009, The International Conference on Nanotechnology and Applications*, Cochin, India, August 14-16, 2009