


## **Brief Biodata**

**Name:** Dr. M. Senthil Kumar

<b>Designation:</b>	Principal Scientist	
<b>DP No. and Name:</b>	3.04 & Sensor Devices and Metrology	
<b>DU No. and Name:</b>	3 & Environment Sciences and Biomedical Metrology	
<b>Email:</b>	<a href="mailto:senthilmk@nplindia.org">senthilmk@nplindia.org</a>	
<b>Date of Joining CSIR-NPL:</b>	19-06-2009	
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### **Research Area/ Interest**

- Plasma Assisted MBE, MOCVD and Laser MBE growth of III-Nitride epitaxial layers and heterostructures for electronic, optoelectronic and energy applications.
- Metal-Semiconductor & Metal-Oxide/Ferroelectric-semiconductor structures
- Development of Metal Oxide Thin films & Nanostructures for gas sensing, field emission and photo-catalytic applications
- Density controlled alignment of CNTs on metal electrodes with electric field.

### **Educational Qualifications**

<b>Degree</b>	<b>Subject</b>	<b>University/ Institute</b>	<b>Year</b>
Ph.D.	Materials Science	Anna University	2002
M.Phil.	Physics	University of Madras	1997
M.Sc.	Physics	Bharathiar University	1995

### **Academic / Research Experience**

<b>Grade / Post</b>	<b>Institute</b>	<b>Duration</b>		<b>Research Field</b>
		<b>From</b>	<b>To</b>	
Scientist	CSIR-NPL	June 2009	Till now	III-Nitrides & Metal Oxides
Post-Doctoral Researcher	Nagoya University, Japan & Chonbuk Nat'l University, Korea	Sep. 2002	May 2009	III-Nitrides

## No. of Publications

No. of Publications in SCI Journals	No. of Publications in non-SCI Journals	No. of Publications in Conference Proceedings	Books Chapters	Total
84	1	10	6	1

## Selected Publications

1. Amit Kumar Mauraya, Debashrita Mahana, Gaurav Jhaa, Bipul Kumar Pradhan, Roopa, Shweta Tomer, Vandana, Preetam Singh, Sunil Singh Kushvaha, Senthil Kumar Muthusamy, Heterostructure nanoarchitectonics with ZnO/SnO<sub>2</sub> for ultrafast and selective detection of CO gas at low ppm levels, *Ceramics International* 48 (2022) 36556-36569.
2. Effect of substrate nitridation and buffer layer on growth of non-polar a-plane GaN epitaxial layer on r-plane sapphire substrate by laser molecular beam epitaxy, Prashant Tyagi, Bipul Kumar Pradhan, Amit Kumar Mauraya, Debashrita Mahana, Vishnu Aggarwal, Govind Gupta, Sunil Singh Kushvaha and Senthil Kumar Muthusamy, *Materials Advances* 3 (2022) 8317.
3. D. Mahana, A. K. Mauraya, P. Pal, P. Singh and Senthil Kumar Muthusamy, Comparative study on surface states and CO gas sensing characteristics of CuO thin films synthesised by vacuum evaporation and sputtering processes, *Materials Research Bulletin* 145 (2022) 111567.
4. Amit Kumar Mauraya, Debashrita Mahana, Prabir Pal, Saravanan Muthiah, Preetam Singh, Senthil Kumar Muthusamy, Effect of bulk and surface modification of SnO<sub>2</sub> thin films with PdO catalyst on CO gas sensing characteristics prepared by vacuum evaporation process, *Journal of Alloys and Compounds* 843 (2020) 155979.
5. Rachana Kumar, Sunil Singh Kushvaha, Mahesh Kumar, Muthusamy Senthil Kumar, Govind Gupta, Kavindra Kandpal, Pramod Kumar, Flexible perylenediimide/GaN organic-inorganic hybrid system with exciting optical and interfacial properties, *Scientific Reports* 10 (2020) 1-11.
6. Prashant Tyagi, Ch Ramesh, Jyoti Kaswan, Swati Dhua, Subish John, Ajay Kumar Shukla, Somnath C. Roy, Sunil Singh Kushvaha, Senthil Kumar Muthusamy, Direct growth of self-aligned single-crystalline GaN nanorod array on flexible Ta foil for photocatalytic solar water-splitting, *J. Alloy. Compound.* 805 (2019) 97-103.
7. P. Tyagi, Ch. Ramesh, Alka Sharma, Sudhir Husale, S.S. Kushvaha, M. Senthil Kumar, Field-emission and photo-detection characteristics of laser molecular beam epitaxy grown homoepitaxial GaN nanowall networks, *Mater. Sci. Semicon. Process.* 97 (2019) 80-84.
8. Prashant Tyagi, Ch Ramesh, S.S. Kushvaha, Monu Mishra, Govind Gupta, B.S. Yadav, M. Senthil Kumar, Dependence of Al incorporation on growth temperature during laser molecular beam epitaxy of Al<sub>x</sub>Ga<sub>1-x</sub>N epitaxial layers on sapphire (0001), *Journal of Alloys and Compounds*, 739 (2018) 122-128.
9. M. Senthil Kumar, K. M. K. Srivatsa, and S. S. Kushvaha, 'Detection of dislocation-related midgap levels in pulsed laser deposited GaN by photo-induced current transient spectroscopy', *Phys. Status Solidi B*, 252 (2015) 800-803.
10. M. Senthil Kumar, S. S. Kushvaha, and K. K. Maurya, 'Low temperature growth of GaN epitaxial layers on sapphire (0001) by pulsed laser deposition using liquid gallium target', *Sci. Adv. Mater.*, 6 (2014) 1215-1220.
11. M. Senthil Kumar, D. Chhikara, and K. M. K. Srivatsa, 'Structure-controlled growth of ZnO nanonails by thermal evaporation technique', *Cryst. Res. Technol.*, 46 (2011) 991 - 996.
12. S. J. Chung, M. Senthil Kumar, Y. S. Lee, E-K. Suh, and M. H. An, 'Characteristics of Mg-doped and In-Mg co-doped p-type GaN epitaxial layers grown by metal organic chemical vapour deposition', *J. Phys. D: Appl. Phys.* 43 (2010) 185101 (4pp).
13. M. Senthil Kumar, Y. S. Lee, J. Y. Park, S. J. Chung, C. -H. Hong and E. -K. Suh, 'Surface morphological studies of green InGaN/GaN multi-quantum wells grown by using MOCVD', *Materials Chemistry and Physics* 113 (2009) 192-195.

14. M. Senthil Kumar, Y.S. Lee, J.Y. Park, S.J. Chung, C.-H. Hong, and E.-K.Suh, 'Improved internal quantum efficiency of green emitting InGaN/GaN multiple quantum wells by In preflow for InGaN well growth', Jpn. J. Appl. Phys. 47 (2008) 839-842.
15. J. Osaka, M. Senthil Kumar, H. Toyoda, T. Ishijima, H. Sugai, and T. Mizutani, 'Role of atomic nitrogen during GaN growth by plasma-assisted molecular beam epitaxy revealed by appearance mass spectrometry', Appl. Phys. Lett. 90 (2007) 172114(3pp).
16. M. Senthil Kumar, V. Suresh Kumar, K. Asokan, J.W. Chiou, J.C. Jan, W.F. Pong, and J. Kumar, 'X-ray absorption spectroscopic study on Ti/n-GaN', Phys. Stat. Solidi (a)-Rapid Research Letters 202 (2005) R161-R163.
17. M. Senthil Kumar, S.J. Chung, H.W. Shim, C-H. Hong, E-K. Suh and H.J. Lee, 'Anomalous current-voltage characteristics of InGaN/GaN light emitting diodes depending on Mg flow rate during p-GaN growth', Semicond. Sci. and Tech., 19 (2004) 725-727.
18. M.Senthil Kumar, T.Y. Kim, S.H. Lee, J.W. Yang, K.S. Nahm and E.-K. Suh, 'Influence of electric field type on the assembly of single walled carbon nanotubes', Chem. Phys. Lett., 383 (2004) 235-239.
19. M.Senthil Kumar, G. Sonia, V. Ramakrishnan, R. Dhanasekaran and J. Kumar, 'Electrical and optical isolation of GaN epitaxial layer by high energy ion irradiation, Nucl. Inst. Meth. B, 207, (2003) 308-313.
20. M. Senthil Kumar, R.R. Sumathi, N.V. Giridharan, R. Jayavel and J. Kumar, 'On the Capacitance - Voltage characteristics of Al/BaTiO<sub>3</sub>/GaN MFS structures', Journal of Crystal Growth, 237-239 (2002) 1176-1179.

### **Current Activities**

- Growth of Thin films and Nanostructures of group III-Nitrides, Metal Oxides and Transition Metal Chalcogenides for energy and environmental device applications.

### **Honour(s)/Award(s)/ Fellowship(s)**

- Post-Doctoral Researcher awarded by Chonbuk National University, Korea & Nagoya University, Japan
- CSIR-Senior Research Fellow

### **Contributions to AcSIR**

- Ph.D. Supervisor (02-Completed;01-Thesis submitted; 03-Ongoing)
- Doctoral Committee Member
- Academic program committee member

### **Membership of Professional Societies/ Institutions**

- Metrology Society of India