

# Sandeep Kumar Chaluvadi, Ph.D.

Post-doctoral Researcher / PVD Process Development Engineer

## SUMMARY

- Expertise in thin film process development and MEMS manufacturing with hands-on experiences of PVD techniques, materials characterization, photolithography, etching, cleanroom wafer fab process and UHV technology
- Process Integration skills with 4+ years of experience in thin film process development with strong technical, scientific and R&D background resulting in 6 publications, 8 international conference presentations and 5 collaborations
- Data interpretation, problem-solving, technical documentation skills and ability to communicate results effectively

## SKILLS & EXPERTISE

<b>Thin Film Techniques</b>	: Evaporation, Pulsed Laser Deposition, RF & DC Sputtering, Ion Gun Deposition, Spin Coating
<b>Material depositions</b>	: Oxides (TiO <sub>2</sub> , SrTiO <sub>3</sub> ), Perovskites, Superconductors (FeSe), 2D materials (MoS <sub>2</sub> ), Dielectrics, Metals (Au, Ag, Pt, Cr, Ni, Co)
<b>Lithography</b>	: MJB3 Mask Aligner, UV Photolithography
<b>Etching</b>	: Reactive Ion Etching (RIE), Ion Beam Etching, Plasma Etching, HF vapour etch, CMP
<b>Metrology</b>	: Profilometer, AFM, STM, MFM, Optical, SEM, Magneto-Optical Kerr Microscopy
<b>Electrical Measurements</b>	: 4-probe resistivity, I-V, semiconductor parameter analyzer
<b>Characterizations</b>	: XRD, XRR, RHEED, LEED, XAS, XPS, Photoluminescence
<b>Software skills</b>	: AutoCAD, COMSOL, LTSpice, OriginLab, NanoScope, Igor
<b>Languages</b>	: English (Professional), French (Intermediate), Hindi, Telugu

## EXPERIENCE

### Postdoctoral Researcher, Elettra Synchrotron, CNR-IOM, Trieste, Italy Sept 2018 – Present

- Thin film process development by PVD, Sputtering and Pulsed Laser Deposition (PLD) techniques in ultra-high vacuum
- Real-time layer-by-layer film growth monitoring by Reflection High Energy Electron Diffraction (RHEED)
- Integration of La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> and SrTiO<sub>3</sub> oxides on Silicon, SOI and SOS wafers by coupling MBE and PLD techniques
- Metal deposition by evaporation and ND:YAG laser for the contacts fabrication
- Characterization of thin films by LEED, XRD, XRR, AFM, STM, SEM and EDX
- Advanced thin film characterizations as XAS, XMCD, XPS in the probing depth (<5 nm) by synchrotron light radiation
- Troubleshooting complex process steps and upgradation of existing equipment by implementing new technology
- Co-ordinated, executed and involved in 6 customer-oriented projects for thin film development protocols of 2D materials, superconductors, topological insulators in the thickness range of 1-50 nm

### Postdoctoral Researcher / Microfabrication Engineer, CNRS, Caen, France Feb 2018 – Aug 2018

- Microfabrication of MEMS devices for the development of a low-field magnetic sensor for biomedical applications
- Design of photo-mask layouts by CAD drawings as per the DRC rules
- Optical Photolithography (Spin coating, Exposure, Develop, Overlay and Defect Inspections), Dry (Reactive Ion Etching, Ion Beam Etching) and wet chemical etching, Ashing, metal LIFT-OFF, visual defects inspection by optical microscope and metrology tools (AFM, Veeco Dektak Profiler, SEM)
- Wire-bonding on the final fabricated devices for electrical connectivity, testing and characterization
- I monitor, inspect the quality of the device at every fabrication process step to increase the efficiency and reproducibility
- Design of experiments DOE, control, optimization and data interpretation of various cleanroom processes
- Involved partially in the design of PVD thin film vacuum deposition cluster and purchased attenuators, vacuum gauges

### Ph.D. Researcher, Université de Caen Normandie, Caen, France Dec 2014 – Dec 2017

- Experimented on epitaxial strain induced electrical and nano-magnetic properties of manganite (LSMO) thin films (5-50 nm) for spintronic applications
- Developed a metal deposition process that improved adhesion quality between "Au/oxide" interfaces

**Visiting Researcher, IMDEA Nanoscience, Madrid, Spain****Sept 2016 – Oct 2016**

- Investigated temperature-dependent (4-300 K) nano-magnetism properties in thin film heterostructures, multilayers by Magneto-Optical Kerr Microscopy

**Project Trainee, National Physical Laboratory, New Delhi, India****Oct 2013 – Sept 2014**

- Pulsed laser deposited epitaxial LaInO<sub>3</sub> thin films for LED's and flat panel display applications

**EDUCATION**

Dec 2014 – Dec 2017	<b>Ph.D. in Micro and nanotechnology</b>	Université de Caen Normandie, CNRS, France
Jun 2012 - May 2014	<b>Master's in Nanotechnology</b>	Vellore Institute of Technology, India ( <b>GPA: 9.18/10</b> )
Jun 2008 – May 2012	<b>Bachelor's in Electronics &amp; Communication</b>	Karunya University, India ( <b>GPA: 8.19/10</b> )

**PUBLICATIONS**

- [1] S. K. Chaluvadi *et al.*, "Pulsed laser deposited FeSe thin films enabling Direct ARPES," *In preparation* 2020.
- [2] S. K. Chaluvadi *et al.*, "Epitaxial strain and thickness dependent structural, electrical and magnetic properties of La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> films," *J. Phys.D: Appl. Phys*, Accepted 2020
- [3] P. Orgiani, A Perucchi, D Knez, R Ciancio, C Bigi, S. K. Chaluvadi *et al.*, "Tuning the Optical Absorption of Anatase Thin Films Across the Visible-To-Near-Infrared Spectral Region," *Phys. Rev. Appl.*, vol. 13, no. 4, p. 044011, Apr. 2020.
- [4] S. K. Chaluvadi *et al.*, "Room temperature biaxial magnetic anisotropy in La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> thin films on SrTiO<sub>3</sub> buffered MgO (001) substrates for spintronic applications," *Appl. Phys. Lett.*, vol. 113, no. 5, p. 052403, Jul. 2018.
- [5] S. K. Chaluvadi *et al.*, "Thickness and angular dependent magnetic anisotropy of La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> thin films by Vectorial Magneto Optical Kerr Magnetometry," *J. Phys. Conf. Ser.*, vol. 903, no. 1, p. 012021, Oct. 2017.
- [6] S. K. Chaluvadi *et al.*, "Pulsed laser deposited LaInO<sub>3</sub> thin films and their photoluminescence characteristics," *J. Lumin.*, vol. 166, pp. 244–247, Oct. 2015.

**CONFERENCES**

1. Oral presentation in "IBS2App conference" at Liguria, Italy (2020)
2. Poster Presentation in "SuperFOX 2020" at Liguria, Italy (2020)
3. Poster presentation in "COST TO-BE Spring meeting" at Barcelona, Spain (2018).
4. Oral presentation in "COST TO-BE Fall meeting" at Riga, Latvia (2017).
5. Poster presentation in "8th Joint European Magnetic Symposium" at Glasgow, Scotland (2016).
6. Poster presentation in "3rd International School on Oxide Electronics" at Cargese, Corsica, France (2015).
7. Poster presentation in "22nd International Workshop on Oxide Electronics" at Paris, France (2015).
8. Poster presentation in "Joint workshop GDRi CNRS MECANO and GDR CNRS OXYFUN" at UC Louvain, Belgium (2015).

**Chaluvadi Sandeep Kumar**

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