

Dr Krishna Valleti, Scientist

Name : Dr Krishna Valleti

Designation : Scientist 'E'

Qualification : PhD in Physics (*Thin films*) - IIT Madras

Thesis title: *Development of rotating cylindrical magnetron cathode and studies on tantalum based hard coatings*



Current Areas of Research

- ✚ Hard & wear resistance Physical Vapor Deposition (PVD) coatings for tribological applications (*conventional and Nanocomposite coatings*)
- ✚ Solar selective coatings for solar thermal CSP applications (*Nitride based functionally multi-layered coatings*)
- ✚ Thin films for sensor applications
- ✚ Thin films for biomedical applications

Associated Technologies

- ✚ Cathodic Arc Physical Vapor Deposition (*CA-PVD*)
- ✚ Electron Beam Evaporation Physical Vapor Deposition (*EB-PVD*)
- ✚ Magnetron Sputtering (*MS*) – *DC, RF, Pulsed & HIPIMS*

Affiliation to Professional Societies

American Vacuum Society (AVS) - ID: 33833

Materials Research Society of India (MRSI) - No: LMB2370

The Indian Institute of Metals (IIM) - No: LM01-53933

Sensors Research Society - No: 219

Society of Vacuum Coaters (SVC)

No. of PhD students Guided/Guiding : 1 (*Awarded*)

No. of MTech Thesis Guided : 3

No. of Trainees Guided : 18

Awards & Achievements

- ✚ Qualified in CSIR - NET with fellowship, GATE & JEST - 2003
- ✚ Received Best Poster Award at the SVC 50th Anniversary Tech Con, Louisville, USA (2007) with a cash prize of \$ 200.

List of journal publications

“The monolithic α , β crystal structural design of piezoelectric poly vinylidene fluoride (PVDF) polymer/fullerene based sensor array for the measurement of lung pressure” N. Manikandan, Krishna Valleti, K. Karupasamy, M. Divagar, Senthil Subramaniam, *Sensing and Bio-Sensing Research* 32 (2021) 100418

“Low Friction Coefficient Nanocomposite CrAlSiN/Gradient-CrAlSiCN Coatings for High Speed/Dry Machining Applications” Puneet C, Krishna Valleti, A Venu Gopal, *Journal of Manufacturing Science and Engineering* 143 (2021) 081013-1

“Cr-(CrN/TiAlN)_m-AlSiN-AlSiO open-air stable solar selective coating for concentrated solar thermal power applications” Krishna Valleti, Smita G. Rao , Pooja Miryalkar , A. Sandeep, D. Srinivasa Rao, *Solar Energy Materials & Solar Cells* 215 (2020) 110634

“Microstructure and Wear of Cathodic Arc Physical Vapour Deposited TiAlN, TiCrN and n-TiAlN/a-Si₃N₄ Films” Manish Roy, S. Saha, and K. Valleti, *Defence Science Journal* 70 (2020) 656-663

“Optical and mechanical properties of Sol-gel prepared Titania (TiO₂)–Silica (SiO₂) mixed thin films ‘as prepared at 300K’ without any post heat treatment” B. M. Pratima, Krishna Valleti and A. Subrahmanyam, *Materials Research Express* 6 (2019) 026407

“Effect of Pulsed Biasing on the Droplet Formation and the Properties of Cylindrical Cathodic Arc–Grown Erosion-Resistant TiN Coatings” Krishna Valleti, K. Sai Jyotheender and D. Srinivasa Rao, *Tribology Transactions*, Volume 62(1) (2019): 88

“CrAlSiN nanocomposite thin films for high-speed machining applications” Puneet C, Krishna Valleti, A. Venu Gopal & S. V. Joshi, *Materials and Manufacturing Processes*, Volume 33 Issue 4 (2018): 371

“Influence of surface preparation on the tool life of cathodic arc PVD coated twist drills” Puneet C, Krishna Valleti, A. Venu Gopal, *Journal of Manufacturing Processes* 27 (2017): 233

“Studies on cathodic arc PVD grown TiCrN based erosion resistant thin films” Krishna Valleti, Puneet C, Rama Krishna L, and Shrikant V. Joshi, *Journal of Vacuum Science & Technology A* 34, 041512 (2016)

“High temperature stable solar selective coatings by cathodic arc PVD for heat collecting elements” Krishna Valleti, D. Murali Krishna, P. Mohan Reddy, Shrikant V. Joshi, *Solar Energy Materials and Solar Cells* 145 (2016):447

“Effect of microstructure and phase constitution on mechanical properties of $Ti_{1-x}Al_xN$ coatings” Sai Pramod Pemmasani, Krishna Valleti, Ravi C. Gundakaram, Koteswararao V. Rajulapati, Ramakrishna Mantripragada, Suresh Koppoju, Shrikant V. Joshi, *Applied Surface Science* 313 (2014): 936

“Functional multi-layer nitride coatings for high temperature solar selective applications” Krishna Valleti, D. Murali Krishna, S.V. Joshi, *Solar Energy Materials and Solar cells* 121 (2014): 14

“Characterization of multilayer nitride coatings by electron microscopy and modulus mapping” Sai Pramod Pemmasani, Koteswararao V. Rajulapati, M. Ramakrishna, Krishna Valleti, Ravi C. Gundakaram, Shrikant V. Joshi, *Materials Characterization* 81 (2013): 7

“Factors influencing properties of CrN thin films grown by cylindrical cathodic arc physical vapor deposition on HSS substrates” Krishna Valleti, C. Rejin, Shrikant V. Joshi, *Material Science and Engineering A* 545 (2012): 155

“Structure-property correlations in cathodic arc deposited TiAlN coatings” Sai Pramod Pemmasania, Krishna Valleti, M. Ramakrishna, K.V. Rajulapati, Ravi C. Gundakaram, S.V. Joshi, *Material Science Forum* 702-703 (2012)

“Influence of substrate temperature and bias voltage on properties of chromium nitride thin films deposited by cylindrical cathodic arc deposition” Krishna Valleti, A. Jyothirmayi, M. Ramakrishna and S. V. Joshi, *Journal of Vacuum Science and Technology A* 29 (2011): 051515

“Processing – Structure – Property relationships in electron beam physical vapor deposited yttria stabilized zirconia coatings” D. Srinivasa Rao, Krishna Valleti, S. V. Joshi, G. Ranga Janardhan, *Journal of Vacuum science and Technology A* 29 (2011): 031501-1

“Studies on hard TaN thin film deposition by R C-Mag technique” Krishna Valleti, *Journal of Vacuum Science and Technology A* 27 (2009): 626

“Studies on phase dependent mechanical properties of DC magnetron sputtered TaN thin films: Evaluation of super hardness in orthorhombic Ta₄N phase”. Krishna Valleti, A. Subrahmanyam, Shrikant V. Joshi, A. R. Phani, M. Passacantando and S. Santucci. *Journal of Physics D: Applied Physics* 41 (2008): 045409

“Growth of nanocrystalline near α -phase Tantalum thin films at room temperature using cylindrical magnetron cathode”. Krishna Valleti, A. Subrahmanyam and Shrikant V. Joshi. *Surface & Coatings Technology* 202 (2008): 3325.

“The effect of arc suppression on the physical properties of Low temperature DC magnetron sputtered tantalum thin films”. A. Subrahmanyam, Krishna Valleti, Shrikant V. Joshi, and G. Sundararajan. *Journal of Vacuum Science and Technology A* 25 (2007): 378

“Pulsed DC magnetron sputtered tantalum nitride hard coatings for tribological applications”. Aditya Aryasomayajula, Krishna Valleti, Subrahmanyam Aryasomayajula, Deepak G. Bhat. *Surface & Coatings Technology* 201 (2006): 4401.

List of patents

“An improved solar selective multi-layer coating and a method of depositing the same” **Indian Patent No: 303791, Grant date: 30/11/2018**

“Improved cylindrical magnetron cathode and a process for depositing thin films on surfaces using the said cathode” **Indian Patent No: 320582, Grant date: 16/09/2019.**

Conference proceedings

“Cathodic Arc PVD grown thin films/coatings for strategic applications” International Conference on Advanced Materials and Processes for Defence Applications (ADMAT) September 23 – September 25 2019, Hyderabad, India.

“An endeavour to understand erosion failure mechanism in TiCrN coatings” 42nd ICMCTF Conference, April 20th – 24th 2015, San Diego, U.S.A.

“Influence of Composition and Architecture on Mechanical Properties of Cathodic Arc Deposited Ti-Al-N Coatings” 40th ICMCTF Conference, April 29th – May 3rd 2013, San Diego, U.S.A.

“Nanostructured Nitride Coatings for Improved Wear and Corrosion Resistance” International Conference on Nanoscience and Nanotechnology (ICONSAT 2012), Jan 21st -23rd 2012, Hyderabad, India

“Implementation of C-CAPVD grown refractory metal nitride coatings for solar thermal applications” International Conference on Nanoscience and Technology 2012, January 20 –January 23, Hyderabad, India.

“Studies on pulsed rotating cylindrical magnetron sputtered tantalum thin films” 50th Annual Society of Vacuum Coaters (SVC) Technical Conference, April 28- May 3, 2007, Louisville, Kentucky, USA. “Received Best Poster Award”

“Effect of grain size on mechanical properties of Pulsed DC magnetron sputtered Tantalum thin films” Eighth International Conference on Nanostructured Materials, August 20-25, 2006, IISc Bangalore, INDIA.

“Studies on Pulsed DC magnetron sputtered Tantalum thin films for hard coating applications: Effect of substrate temperature” 5th international surface engineering congress during May 15-17, 2006, Seattle, Washington, USA.

List of sponsored projects

“Development of tungsten fiber reinforced tungsten composite for plasma facing component” IPR, Gandhinagar – 01.04.2021 – 31.03.2023.

“Development and field demonstration of paddy straw-based briquetting plant for decentralized applications in state of Punjab”, Project under CLEAN ENERGY RESEARCH INITIATIVE, DST Govt. of India – 01.07.2019 – 31.03.2022.

“Development of nanocomposite wear resistant coatings for machining tools used in machining of Boiler materials”, Project under CLEAN ENERGY RESEARCH INITIATIVE, DST Govt. of India – 01.09.2018 to 31.08.2022 (Sub project under: *National centre for development of advanced materials and manufacturing processes for clean coal technologies for power applications*)

“Study on effect of different types of PVD coatings on the life and quality of the Minting dies and tools”, MINT Govt. of India, Hyderabad – 01.04.2018 to 31.03.2020 (Completed)

"Development of protective coatings for compressor blades & vanes using cylindrical Cathodic Arc Physical Vapor Deposition technique", 3BRD Chandigarh (3BRD/ENG/TV3/TiN/01 Dated: 31 Oct 2016) – 01.01.2017 to 31.03.2018 (Completed)

"Design and development of open air compatible state-of-the-art solar selective coating for high temperature concentrated solar thermal power generation applications" project under SOLAR ENERGY RESEARCH INITIATIVE (SERI), DST – 03.07.2017 to 30.10.2020 (completed).

“Development of Tungsten Coating Technology for First Wall Application in Fusion Grade Tokamak such as First Wall of ITER, TBM and DEMO” MOU/IPR/ARCI/2014-15/Jul (Completed)

Reviewer for the Journals

Solar Energy Materials and Solar cell

Applied Surface Science

Journal of Materials science and Engineering A

Surface and coatings technology

Ciência & Tecnologia dos Materiais

Transactions of the Indian Institute of Metals

Surface and Interface Analysis

Journal of Building Engineering

Contact Information

Centre for Engineered Coatings (*CEC*)

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)

Balapur, Hyderabad – 500 005

Phone: 040 – 2445 2349

Fax: 04024442699, Email – krishna@arci.res.in or kvalleti@gmail.com