

## **Faculty Profile of Dr.G.Shanmuga Velayutham**



**Dr.G.Shanmuga Velayutham**

**Associate Professor**

**Department of Physics**

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### **Research Area**

- DC Plasma Spray TBC Coatings
- Low-Temperature Plasma
- Surface Modification, coatings

### **Education & Career**

#### **Education**

**Ph. D.**

Subject: Plasma Physics

Institution: Bharathiar University

Affiliated University: Bharathiar University

Year of Award: 2005

**M. Sc.,**

Subject: Physics

Institution: P.S.G.College of Arts and Science

Affiliated University: Bharathiar University

Year of Award: 1998

B. Sc.,

Subject: Physics

Institution: P.S.G.College of Arts and Science

Affiliated University: Bharathiar University

Year of Award: 1996

**Career****At Bharathiar University (Reverse Order)****Past Experience**

Assistant Professor: Aug 2010 to Feb 2011 at PSG Institute of Advanced Studies (PSGIAS), Coimbatore India

Research Engineer in R& D: Jun 2007 to Jul 2010 at Shinoda Plasma Company Ltd, Japan

Research Engineer in R& D: Aug 2006 to Mar 2007 at ADTEC Plasma Company Ltd, Japan

Researcher: Feb 2006 to Mar 2006 at The University of Tokyo

Guest Researcher: Oct 2004 to Jan 2006 at Osaka University

## **Awards**

1. Travel award to attend the conference ISAPS at Japan& Singapore supported by DST
2. Travel award to attend the conference IAPS at Taiwan supported by DST

## **Membership**

### **Professional Bodies**

#### **Member**

Member: Plasma Science Society of India

Period: Life Member

#### **Councilors**

Councilors: Plasma Science Society of India

Period: 2017 - 2019

#### **Member**

Member: Institute of Applied Plasma Science, Japan

#### **Member**

Member: The Japan Society of Applied Physics (JSAP), Japan

#### **Member**

Member: Society for Information Display (SID-Japan chapter)

### **Academic Bodies**

#### **Member**

Member: Board of Studies

Period: 2012 to Till Date

## **Visits**

**Country Visited** : China

**Duration of Visit** : 9 - 12 March, 2012

**Purpose of Visit** : 19th Annual Meeting of IAPS & 5th International Workshop on Plasma Application and Hybrid Functionally Materials at Taiwan

**Country Visited** : Japan

**Duration of Visit** : 9 - 12, December 2009

**Purpose of Visit :** International Display Workshop

**Country Visited :** USA

**Duration of Visit :** 20 - 25 May 2007

**Purpose of Visit :** Proceedings of Annual Meeting of Society of Information Display (SID-2007)

**Country Visited :** Japan

**Duration of Visit :** 6 - 8 December 2006

**Purpose of Visit :** Proceedings of The 13<sup>th</sup> International Display Workshops (IDW`06)

**Country Visited :** Japan

**Duration of Visit :** 29 August to September 1, 2006

**Purpose of Visit :** The 67<sup>th</sup> Annual Meeting 2006, The Japan Society of Applied Physics

**Country Visited :** Japan

**Duration of Visit :** 12 - 14 April, 2006

**Purpose of Visit :** JWS meeting

**Country Visited :** Japan

**Duration of Visit :** 27 May 2005

**Purpose of Visit :** Annual Meeting of High Temperature Society

**Country Visited :** Japan

**Duration of Visit :** March 2005

**Purpose of Visit :** 12<sup>th</sup> Annual meeting of IAPS

**Country Visited :** Japan

**Duration of Visit :** 1 - 2 September 2003

**Purpose of Visit :** 4<sup>th</sup> International Symposium on Applied Plasma Science (ISAPS 2003)

**Country Visited :** Singapore

**Duration of Visit :** 1 - 3 August 2002

**Purpose of Visit :** First International Conference on Materials Processing for Properties and Performance  
(MP<sup>3</sup>-2002)

**Collaborators**

## Others

## Projects

Funded Projects(National Level)

- [Ongoing - 03](#)
- [Completed - 02](#)

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### 1. DAE - BRNS

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**Title of the project:** Simulation of Plasma Transferred Arc Characteristics During Plasma Materials Processing

**Funding Agency:** DAE - BRNS

**Amount:** Rs. 29.109 Lakhs

**Duration:** 2016-2019

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### 2. DST-SERB

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**Title of the project:** Measurement of Electrothermal Efficiency, Deposition Efficiency of the Plasma Spray Torch and Development of a Nanostructure Lanthanum Zirconate Thermal Barrier Coatings

**Funding Agency:** DST-SERB

**Amount:** Rs. 20.80 Lakhs

**Duration:** September 2013 - August 2016

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### 1. TANSCHÉ

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**Title of the project :** Synthesis of Magnetic Nanopowders by Plasma Arc Discharge

**Funding Agency :** Tamilnadu State Council for Higher Education

**Amount :** Rs. 28.70 Lakhs

**Duration :** 2021-2024

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## **2. RUSA-2.0, BCTRC**

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**Title of the project:** Dielectric Barrier Discharge (DBD) plasma for surface modification of polymers and drug Delivery

**Funding Agency:** RUSA-2.0 BHARATHIAR CANCER THERANOSTICS RESEARCH CENTRE

**Amount:** Rs. 23 Lakhs

**Duration:** 2021-2024

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## **3. DRDO (ER & IPR)**

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**Title of the project:** Studies on nuclear fission reaction process with orientation to nuclear data needs of India's advanced reactor program

**Funding Agency:** DRDO (ER & IPR)

**Amount:** Rs. 13.386 Lakhs

**Duration:** 2018-2021

Consultancy Projects

- [Ongoing](#)
- [Completed](#)

**Research Guidance**

- [Post Doc.](#)
- [Ph.D.](#)
- [M.Phil.](#)
- [M.Sc.](#)

Ongoing

Title

Name

Completed

Title

Name

Ongoing

Sample Data.

Completed-04

**E M. Koushika**

Title of the thesis: Preparation and characterization of surface passive  $\alpha$ -Fe

nanopowders by plasma arc discharge for textile effluent degradation

Year of award: 2019 (thesis submitted)

**K. Praveen**

Title of the thesis: Development of rare earth cerate based thermal barrier coatings and its mitigation against volcanic ash infiltration

Year of award: 2018

**S. Sivakumar**

Title of the thesis: Preparation and characterization of atmospheric plasma sprayed lanthanum zirconate( $\text{La}_2\text{Zr}_2\text{O}_7$ ) coatings for thermal barrier applications

Year of award: 2017

**Suganya**

Title of the thesis: Study on surface properties of plasma modified PVC, PS, PMMA and cotton fabric by DC glow discharge plasma for industrial applications

Year of award: 2017

Ongoing

Sample Data.

Completed-13

**C. Archana**

Title of the thesis: Study on hot corrosion behavior of plasma sprayed lanthanum cerate, Yttria stabilized zirconia and composite thermal barrier coatings.

Year of award: 2018

**K. Nivetha**

Title of the thesis: Study on spatial measurements of plasma parameters on DC glow discharge plasma by using single Langmuir probe and surface grafted polyethylene terephthalate (PET) film with chitosan for antibacterial activity

Year of award: 2018



**L. Kumaresen**

Title of the thesis: Synthesis of zirconium from zircon sand through carbothermal reduction and nitridation in transferred arc plasma reactor  
Year of award: 2017

**S. B. Tharchanaa**

Title of the thesis: Study on antibacterial activity of Cu,Cu<sub>2</sub>O nanopowders synthesized by DC transferred arc plasma method  
Year of award: 2016

**V. Krishnaveni**

Title of the thesis: Study on plasma parameters of argon, oxygen, and air plasma by using Langmuir single probe method  
Year of award: 2016

**R. Swathi**

Title of the thesis: Surface analysis of plasma treated polystyrene (PC) film for industrial applications  
Year of award: 2015

**A. Saravanapriya**

Title of the thesis: Study on electrothermal efficiency of DC plasma torch and Characterization of Plasma sprayed Al<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub>  
Year of award: 2015

**J. Bhuvaneshwari**

Title of the thesis: Characterization study of plasma sprayed YSZ and YSZ+Al<sub>2</sub>O<sub>3</sub> coatings by DC plasma spray torch system  
Year of award: 2015

**S. Gowthamaraju**

Title of the thesis: Analysis of microstructure, wear and corrosion behaviour of Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, and Cr<sub>2</sub>O<sub>3</sub> composite coatings by DC atmospheric plasma spray torch  
Year of award: 2013

**M. Kiruthika**

Title of the thesis: Improvement on hydrophilic property and antibacterial properties of polyester fabric treated by DC glow discharge plasma  
Year of award: 2013

**K. Shobana**

Title of the thesis: Surface modification of gray cotton fabrics by low pressure atmospheric DC glow discharge plasma

Year of award: 2012

**A. Chandraprakash**

Title of the thesis: A study on electrothermal efficiency of plasma spray torch and alumina-Titania composites coating

Year of award: 2012

**R. Saranya**

Title of the thesis: Fabrication and characterization of Allumina-Titania composites through ball milling

Year of award: 2012

Ongoing

Sample Data.

Completed-17

**P. Bhagyashree**

Title of the thesis: Study on superhydrophobic and self-cleaning properties for oxygen plasma treated cotton fabric with natural dye coated by using DC glow discharge plasma

Year of award: 2019

**S. Sathileelavathi**

Title of the thesis: Phase evaluation of plasma sprayed lanthanum cerate and yttria stabilized zirconia composite coatings in V2O5 environment

Year of award: 2019

**P. Naveena**

Title of the thesis: Synthesis and characterization of copper and copper oxides nanopowders from copper scrap by using plasma arc discharge method

Year of award: 2019

**K. Janani**

Study on variation of plasma parameters using single Langmuir probe and surface modification of polyethylene terephthalate (PET) film by argon glow discharge plasma

Year of award: 2018

**L. Sathyavani**

Title of the thesis: Spatial measurement of plasma parameters on DC glow discharge using single Langmuir probe

Year of award: 2018

**R. Deepika**

Title of the thesis: Study on phase analysis of iron oxide nanopowders processed by transferred arc plasma method

Year of award: 2017

**K. Priya**

Title of the thesis: Investigation on surface properties of plasma treated cotton fabric

Year of award: 2017

**R. Renuka**

Title of the thesis: Study on plasma parameters by using Langmuir single probe method

Year of award: 2017

**S. Yogapriya**

Title of the thesis: Investigation on surface properties of low temperature plasma treated PMMA film

Year of award: 2016

**R. Sangeetha**

Title of the thesis: Study on hydrophilic nature of the surface modified PMMA film by DC glow discharge plasma

Year of award: 2016

**V. Krishnaveni**

Title of the thesis: Plasma induced immobilization of chitosan on the polystyrene film for active food packaging

Year of award: 2015

**S. B. Tharchanaa**

Title of the thesis: Study on hot corrosion behaviour of sintered YSZ and Al<sub>2</sub>O<sub>3</sub>+YSZ Composites for thermal barrier coatings

Year of award: 2015

**M. Karthika**

Title of the thesis: Improvement of hydrophilic nature of PVC polymer by surface modification using DC Glow discharge plasma and Grafting with TiO<sub>2</sub>/PVP

Year of award: 2014

**P. Rupa Kasturi**

Title of the thesis: Preparation of lanthanum zirconate composite powder for thermal barrier coating application by using ball mill method

Year of award: 2013

**P. Jeyapal**

Title of the thesis: Corrosion behaviour study of atmospheric plasma sprayed alumina coatings

Year of award: 2013

**A. Saravana priya**

Title of the thesis: Antibacterial study of DC glow discharge plasma treated cotton fabrics

Year of award: 2013

**R. Thendrala**

Title of the thesis: Study of breakdown potentials in nitrogen and argon plasma

Year of award: 2012

**Research Publication**

- [International](#)
- [National](#)
- [Patents](#)
- [Conferences](#)
- [Books/Chapters](#)
- [Database](#)

## Reverse Chronological Order

2021

37. [Plasma Surface Modification of Cotton Fabric by Using Low Pressure Plasma](#)

G. Shanmugavelayutham, T. Anupriyanka; P. Bhagyashree; P. Premasudha

IEEE Transactions on Plasma Science (2021)

Special Issue - Selected papers from First International Conference on Advances in Plasma Science and Technology

2020

36. Surface Roughness Characterization of Plasma Textured Polycrystalline Silicon Solar Wafer With The Laser Speckle Technique

R. Balamurugan, R. Prakasam, B. Jeeva, T. Anupriyanka, G. Shanmugavelayutham

AIP Conference Proceedings 2270, 90001 (2020)

35. [Volcanic Ash Infiltration Resistance of New-Generation Thermal Barrier Coatings at 1150 °C](#)

K. Praveen, G. Sivakumar and G. Shanmugavelayutham

Surface & Coatings Technology 401, 126226 –126235 (2020)

34. [Fabrication of Nickel-Yttria Stabilized Zirconia 3D Micro-Pattern by Atmospheric Plasma Spray as a Dual-Functional Electrocatalyst for Overall Water Splitting Applications in Alkaline Medium](#)

S. Sivakumar, S. Yugeswaran, K. Vijaya Sankar, L. Kumaresan, G. Shanmugavelayutham, Yoed Tsur and Zhu Jianguo

Journal of Power Sources 473, 228526 (2020)

33. [A Single Step Approach of Fabricating Superhydrophobic PET Fabric by Using Low Pressure Plasma for Oil-Water Separation](#)

T. Anupriyanka, G. Shanmugavelayutham, Bornali Sarma and M. Mariammal

Colloids and Surfaces A: Physicochemical and Engineering Aspects 600, 124949 (2020)

32. [Facile Synthesis of Cu and CuO Nanoparticles From Copper Scrap Using Plasma Arc Discharge Method and Evaluation of Antibacterial](#)

S. B. Tharchanaa, K. Priyanka, K. Preethi and G. Shanmugavelayutham  
Materials Technology 36, 2 , 97-104 (2020)

31. [Characteristics of Anodic Glow Pulsed Plasma](#)

M. Kiruthika and G. Shanmugavelayutham  
Physics Letters A 384, 1, 126040 (2020)

2019-2000

30. [Physical and Mechanical Properties of Surface Modified Poly Ethylene Terephthalate Films Through Low Pressure Plasma and Ultra-Violet Light](#)

M. Kiruthika, K. Nivetha and G. Shanmugavelayutham  
Materials Research Express 6, 11, 115350 (2019)

29. [Influence of He and N<sub>2</sub> Plasma on In-Situ Surface Passivated Fe Nanopowders by Plasma Arc Discharge](#)

E. M. Koushika, C. Balasubramanian, P. Saravanan and G. Shanmugavelayutham  
J. Phys.: Condens. Matter 31, 475302-475310 (2019)

28. [Hot Corrosion Behaviour of Atmospheric and Solution Precursor Plasma Sprayed \(La<sub>0.9</sub>Gd<sub>0.1</sub>\)<sub>2</sub>Ce<sub>2</sub>O<sub>7</sub> Coatings in Sulfate and Vanadate Environments](#)

K. Praveen, Nalla Sravani, Rahul Jude Alroy G. Shanmugavelayutham and G. Sivakumar  
Journal of European Ceramic Society 39, 14, 4233-4244 (2019)

27. [Plasma Surface Modified Polystyrene and Grafted with Chitosan Coating for Improving the Shelf Lifetime of Postharvest Grapes](#)

A. Suganya, G. Shanmugavelayutham and J. Hidalgo-Carrillo  
Plasma Chemistry and Plasma Processing 38 , 1151-1168 (2018)

26. [Synthesis of Zirconium Nitride From Zircon Sand by Transferred Arc Plasma Assisted Carbothermal Reduction and Nitridation Process](#)

- S.Yugeswaran, P.V. Ananthapadmanabhan, L. Kumaresan, A. Kuberan, S. Sivakumar, G. Shanmugavelayutham,  
K. Ramachandran  
Ceramics International 44, 12, 14789-14796 ( 2018)
25. Synthesis of Plasma Spray Grade Lanthanum Titanium Aluminate by Plasma Processing for Thermal Barrier Coatings  
Gurusamy Shanmugavelayutham, Kandasamy Praveen , Sankaran Sivakumar  
Frontier of Applied Plasma Technology 11, 1, 27-30 (2018)
24. [Rapid Synthesis of Nano-Magnetite by Thermal Plasma Route and Its Magnetic Properties](#)  
E. M. Koushika, G. Shanmugavelayutham, P. Saravanan & C. Balasubramanian  
Materials and manufacturing Processes, 33, 15, 1701-1707 (2018).
23. [Lanthanum Cerate Thermal Barrier Coatings Generated from Thermal Plasma Synthesized Powders](#)  
K. Praveen, S. Sivakumar, P.V. Ananthapadmanabhan, G. Shanmugavelayutham  
Ceramics International, 44, 6, 6417-6425 (2018)
22. [Influence of Water Vapour on Structural and Thermal Conductivity of Post-Heat Treated Plasma Sprayed LZ and YSZ Coatings](#)  
S. Sivakumar, G. Shanmugavelayutham, S. Yugeswaran and J. Mostaghimi  
Journal of Alloys and Compounds 740, 212-221 (2018)
21. [Preparation and Thermophysical Properties of Plasma Sprayed Lanthanum Zirconate](#)  
S. Sivakumar, K. Praveen and G. Shanmugavelayutham  
Materials Chemistry and Physics 204, 67-71 (2018)
20. [Thermo-Physical Behavior of Atmospheric Plasma Sprayed High Porosity Lanthanum Zirconate Coatings](#)  
S. Sivakumar, K. Praveen, G. Shanmugavelayutham, S. Yugeswaran and J. Mostaghimi  
Surface & Coatings Technology 326, 173-182 (2017)

19. [Study on Plasma Pre-Functionalized PVC Film Grafted With TiO<sub>2</sub>/PVP to Improve Blood Compatible and Antibacterial Properties](#)

A.Suganya, G. Shanmugavealyutham and Carmen Serra Rodriquez  
J.Phys.D: Appl.Phys 50, 145402 (2017)

18. [Study on Structural, Morphological and Thermal Properties of Surface Modified Polyvinylchloride \(PVC\) Film Under Air, Argon and Oxygen Discharge Plasma](#)

A. Suganya, G. Shanmugavelayutham and C.S. Rodríguez  
Materials Research Express 3, 9, 95302-95319 (2016)

17. Characterisation of DC Plasma Spray Torch and Synthesis of Lanthanum Zirconate for Thermal Barrier Coatings by Ball Milling Method

S. Sivakumar, K. Praveen and G. Shanmugavealyutham  
International Journal of Chemical and Physical Sciences 4, 6, 61-65  
(2015)

16. Analytical Study of Electrothermal Efficiency of Plasma Jet in Plasma Spray Torch

T. Mahalingam, T. Venkatachalam and G. Shanmugavelayutham  
International Journal of Chemical and Physical Sciences 4, 6, 112-121  
(2015)

15. [Performace Study of Wear Resistance and Solid Lubricant Surface Coatings on Textile Machinery Components](#)

G. Shanmugavelayutham, V. Selvarajan and S. Yugeswaran, M. Vijay, K. Suresh

S. Vijeyakumar, L. Markkandan and P.V.A. Padmanabhan Composite interfaces 19, 03-04, 239-249 (2012)

14. Characterisation and Performance Study of Solid Lubricant and Wear Resistant Surface Coatings

G. Shanmugavelayutham, V. Selvarajan and S. Yugeswaran  
Plasma Application & Hybrid Functionally materials 21, 31-32 (2012)

13. [Mechanical Properties and Oxidation Behaviour of Plasma Sprayed Functionally Graded Zirconia/Alumina Thermal Barrier Coatings](#)



G. Shanmugavelayutham and A. Kobayashi  
Materials Chemistry and Physics 103, 2-3, 283-289 (2007)

12. [Study Improvement of Oxide Layer and Properties of Plasma Sprayed Alumina in Thermal Barrier Coatings](#)

A.Kobayashi, G. Shanmugavelayutham and S.Yano  
Solid State Phenomena 127, 313-318 (2007)

11. [Effect of Powder Loading on The Excitation Temperature of a Plasma Jet in DC Thermal Plasma Spray Torch](#)

G. Shanmugavelayutham, V. Selvarajan, P.V.A. Padmanabhan, K.P. Sreekumar and N.K. Joshi  
Current Applied Physics 7, 186-192 (2007)

10. Effect of Annealing on Plasma Sprayed Zirconia-Alumina Composite Coating

A.Kobayashi, G. Shanmugavelayutham and Y. Ando  
Transaction of JWRI 35, 2, 17-21 (2006)

9. Oxidation Behaviour of Plasma Sprayed ZrO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Thermal Barrier Coatings by Gas Tunnel

Type Plasma Spraying

G. Shanmugavelayutham and Akira Kobayashi  
Plasma Applications and Hybrid Functionally Materials 15, 77-78 (2006)

8. Mechanical Properties and Oxidation Behaviour of Plasma Sprayed ZrO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Thermal Barrier Coatings by Gas Tunnel

Type Plasma Spraying

G. Shanmugavelayutham and A. Kobayashi  
Smart Processing Technology, 1, 45-48 (2006).

7. [Microstructural Characterization and Properties of ZrO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Thermal Barrier Coatings by Gas Tunnel-Type Plasma Spray](#)

Gurusamy Shanmugavelayutham Shoji Yano and Akira Kobayashi  
Vacuum 8, 11-12, 1336-1340 (2006)

6. [In-flight Particle Behaviour and Its Effect on Co-Spraying of Alumina-Titania](#)

G. Shanmugavelayutham, V. Selvarajan, T.K. Thiyagarajan, P.V.A.

Padmanabhan

K.P. Sreekumar, R.U. Satpute

Current Applied Physics 6, 41-47 (2006)

5. Effect of Process Parameters on Microstructure and Hardness of Plasma Sprayed Zirconia-Alumina Composite Coatings

by Gas Tunnel Type Plasma Spraying

G. Shanmugavelayutham and A. Kobayashi

Transaction of JWRI 34, 1, 43-47 (2005)

4. Porosity Measurement By Image Analysis for the Composite Coatings by Gas Tunnel Type Plasma Spraying

G. Shanmugavelayutham and Akira Kobayashi

Plasma Applications and Hybrid Functionally Materials 14, 79-82 (2005)

3. [Plasma Spheroidization of Nickel Powders in a Plasma Reactor](#)

G. Shanmugavelayutham and V. Selvarajan

Bulletin of Materials Science 27, 5, 453-457 (2004)

2. [Electrothermal Efficiency, Temperature and Thermal Conductivity of Plasma Jet in a DC Plasma Spray Torch](#)

G. Shanmugavelayutham and V. Selvarajan

Pramana - Journal of Physics 61,6, 1109-1119 (2003)

1. [An Attempt to Develop Relations for the Arc Voltage in Relation to the Arc Current and Gas Flow Rate](#)

R. Ramasamy, V. Selvarajan, K. Perumal and G. Shanmugavelayutham

Vacuum 59, 118-125 (2000)

Alumini Reflections: