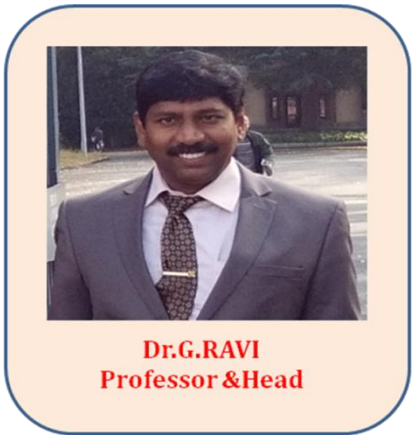
Research Interest

Faculty I

Area of Research/Specialization:



Crystal growth is a universal phenomenon in the field of Materials Science. Progress in crystal growth technology has led to a variety of crystals suitable for device applications and also turn paved the way for the growth of defect free crystals. Many type of crystals like nonlinear, ferroelectric and semiconducting crystals are finding applications in LASER, LED, thermal imaging, semiconductor memories, IR detectors, optical communication devices etc. In our group, we grew and characterized variety of crystals like DKDP, TGS, DAST, LAP, SLN, SLT etc., Finding the suitability of the crystals tested by electro-optic measurement has led to design and fabrication of proto type devices like electro-optic modulator, second harmonic generators and holographic optical memories. Fabrication of semiconductor metal oxide thin films such as Tungsten oxide (WO_3), Molybdenum oxide (MoO_3), Cerium Oxide (CeO_2), Vanadium Oxide (V_2O_5) and Zinc Oxide (ZnO) deposited on different substrates are extensively studied for technological and industrial applications towards sensors, memory devices, electro-chromic, catalysis, and solar cell applications. Particularly, these metal oxides with particular nanostructures such as nano rods, nano wires and various nano dimensions are expected to enhance the properties and performance of the gas sensor.

- Crystal growth of organic& inorganic materials
- Nano materials synthesis and Thin Films preparation for sensor applications
- Opto-electronics and E-O modulator –Devices

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	222
No. of papers presented in Conferences	:	175
h-index	:	25
i-10 index	:	62
Total Citations	:	2220
Patents Granted/Filed	:	Nil

Awards and Recognitions

1. Senior Research Fellow (SRF)- CSIR, Govt. of India, 1993
2. Young Researcher Award- (IUMRS-ICA), IISc., Bangalore, India, 1998
3. Young Scientist Award- ICCG-13, Kyoto, Japan, 2001
4. Young Invited Researcher Award, Cheju, Korea (ICPOP), 2001
5. Invited Special Researcher, NIMS, Japan, Nov. 2001-March 2002
6. JSPS Award, Japan Society for Promotion of Science, Japan, April 2002-March 2004
7. Invited Special Researcher, NIMS, Japan, June-Nov. 2004
8. Best Researcher Award, Alagappa University, 2005
9. Invited Special Researcher, NIMS, Japan, Jan.- Feb. 2006
10. Visiting Professor, Shizuoka University, Japan, Aug-Nov. 2012
11. Honorable Guest Professor, Shizuoka University, Japan, April 2014
12. Alagappa Excellence Award for Research (2015-2016), Alagappa University, 2016
13. Honorable Guest Professor, Shizuoka University, Japan, April 2016
14. JSPS Invitation Fellowship, Japan, Nov.-Dec. 2016

Research Group Members

S. Sheik Fareed, P.Sakthivel, S. Asaithambi, M. Karuppaiah, Sureshkumar,

Past Members

- MD. MostakHossain, Bangladesh University of Engineering and Technology
- A.S. HajaHameed, Jamaal Mohamed College, Trichy
- A. Nixon Azariah, Mount Zion college, Pudukkottai
- Ra. Shanmugavadivu, R.D.M. Govt. Arts College, Sivagangai
- J. Wilson, Alagappa University, Karaikudi
- S. Sankar, Govt.Hr.Sec. School, Kanchipuram
- S.D. Gopalram, Gwangju Institute of Science & Technology, Korea.
- MR. Manikandan, Chinese Academy of Sciences, China
- M. Thangaraj, PSN Engineering College, Dindigal
- G.Anandhababu, Chinese Academy of Sciences, China
- R.Senthikumar, KIT&KIM, Karaikudi
- G.Vijayaprasath, NPDF, CECRI, Karaikudi
- T.Shrividhya, Kalasalingam University, Krishnankoil.
- R.Murugan

Faculty II

Dr. K.SANKARANARAYANAN
Professor & Chairperson

Area of Research/Specialization:

Materials Science is one of the indispensable fields of research where all the streams of science can contribute. "No Materials – No Technology" and "No Technology – No Materials". Being an anisotropic, unidirectional crystals are the pre-requisite for any device industry in order to achieve the desire property. Organic and inorganic crystals are being grown from solution and melt techniques to meet the demands for unidirectional crystals. If the kinetics of the crystallization are understood, then one can design a material with specific characteristic. Research on these vital areas will certainly yield valuable outputs.

- Materials Science
- Crystallization kinetics of organic and inorganic materials.
- Unidirectional growth of bulk organic and inorganic crystals.
- III-V Semiconductor materials – synthesis and growth.

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	73
No. of papers presented in Conferences	:	55
h-index	:	18
i-10 index	:	31
Total Citations	:	1067
Patents Granted/Filed	:	2

1. "Development of a novel material CuCdS as a UV Sensor". Appl.No. 693/CHE/2010: Dt.10.2.2011 and
2. "A System For Growing A Unidirectional Organic Single Crystal Compound And Method Thereof"Appl.No. 201641011210, Date:30.3.2016

Awards and Recognitions

1. Indo-China Bilateral Students Exchange Fellowship *(1992-93)*
   By Ministry of Human Resource Development, Govt. of India, New Delhi.
2. Young Scientist Fellowship *(1995-96)* by Tamil Nadu State Council for Science and Technology, Govt. of Tamil Nadu, Chennai, India.
3. Prof.P.Ramasamy National Award for Crystal Growth *(2005)* by Indian Association for Crystal Growth, Anna University, Chennai.
4. Best Researcher Cash Award *(2005-2006)*, Alagappa University, Karaikudi
5. Visiting Professor (*April, 2010-July, 2010)* – Research Institute of Electronics, Shizuoka University, Hamamatsu, Japan.

6. Visiting Scientist (19-10-2014 to 24-10-2014) – Hebei Semiconductor Research Institute, Shijiazhuang, China.

Research Group Members

K.Bhavani, S.Dhatchayani, N.Sarala, V.Govindhan, K.Pandimurugan, A.Aadheeswaran

Past Members

- T.Premkumar, Post-Doctoral Fellow, RISE-GIST, South Korea, Assistant Professor, SN College, Madurai.

Faculty III

Area of Research/Specialization:

Dr.M.SIVAKUMAR
Assistant Professor

The diverse range of energy storage applications has spawned a multitude of special batteries such as lithium ion, lithium sulfur and sodium ion batteries each optimized for particular use. Electrolyte plays a key role in transporting the positive Lithium ion between the cathode and anode. LIB cathode materials are made up from lithium liberating compounds with various structures like spinal, layered, olivine for high power and energy density applications. In addition to a fore mentioned energy storage devices, new type of battery, Li-sulfur (Li-S) battery with high theoretical specific capacities are considered as another option. Moving from traditional cathode to sulfur has many merits beside high capacity such as low cost, safety operating voltage, and non-toxicity. Sodium ion batteries are considered as a top alternative to LIBs for large scale renewable energy storage units due to their low cost and the abundance. They are non-toxic, exhibit suitable redox potential and show similar intercalation chemistry to that of Lithium.

- **Solid State Ionics**
- **Lithium Battery Electrodes and Electrolytes**
- **Sodium and Sulfur battery electrodes**
- **Fuel Cells**
- **Biodiesel**

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	66
No. of papers presented in Conferences	:	105
h-index	:	11
i-10 index	:	12
Total Citations	:	809
Patents Granted/Filed	:	Nil

Awards and Recognitions

1. Post-Doctoral Fellowship – 15.11.2004 to 31.07.2006 –National Science Committee, Taiwan ROC.
2. Visiting Principal Scientist in DST-NSC Collaborative Research Project during 2011-14.
3. Best Paper Award with cash prize for our paper entitled "Effect of ZrO_2 filler on P(S-MMA) gel blend polymer electrolyte for Lithium polymer battery" - M.Ramachandran, R.Subadevi, M.Sivakumar Presented in the International Conference on Nanoscience and Nanotechnology for Energy Applications (EApp-2016) organized by Centre for Nanoscience and Nanotechnology and Centre of Excellence for Energy Research, Sathyabama University, Chennai-600 119. India during 27-29, June 2016.
4. DST-INSPIRE Assessment Committee Member , CECRI, Karaikudi

Research Group Members

R.Muthupradeepa, R.Dhanalakshmi, M.Ramachandran, G.Radhika, K.Krishnaveni, K.Diwakar, V.Priyanka, P.Arjunan, M.Kouthaman, K.Kannan, C.Kalaiselvi, P.Rajkumar, V.Meenakshi, M.Shanthi

Past Members

- R.Muruganantham, Chung-Yuan Christian University, Taiwan
- P.Prahasini, Alagappa Govt. Polytechnic College, Karaikudi

Faculty IV

Area of Research/Specialization:

Dr.N.ANANDHAN
Assistant Professor

Synthesis of the low dimension materials called nanomaterials is an interesting area of research in Materials Science and has a considerableattention due to their use in energy conversion devices for reducing the fossil fuel demands, environmental pollutions, and in biomedicalapplication such as bone implantation. In energy conversion devices, thenanostructured metal oxides such as zinc oxide (ZnO) and cuprous oxide (Cu_2O) are attractive materials due their easy tailoring of different morphologies because of the optical and electrical properties highly depend on the morphology of the thin films. The Cu_2O and ZnOthin films are prepared for heterojunction solar cell by usingthe low temperature electrochemical deposition technique ontransparent conductive oxide (TCO) substrate. In heterojunction solar cell,Cu_2O deposited in alkaline solution is used as a p-type semiconductorandZnO deposited in neutral solution is used as an n-type semiconductor. The electrochemical deposition method is one of the best techniques because of the low synthesis temperature to crystallize the nanostructures and easy control of morphology of the Cu_2O by varying the deposition potential, concentration, temperature and time. Hydroxyapatitenano powders with different metals doping are synthesized by wet chemical precipitation method and these prepared powders are further deposited as a thin film form on titanium (Ti) substrate using radio frequency (RF) sputtering by varying deposition temperature, RF power, substrate distance and deposition time. Finally the optimized thin films are used for bone implantation.

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	35
No. of papers presented in Conferences	:	51
h-index	:	06
i-10 index	:	03
Total Citations	:	129
Patents Granted/Filed	:	Nil

Awards and Recognitions

Best paper presentation award from National Conference on Materials for Energy and Environment (NCMEE-2012)organised by Department of Science and Humanities, Chendu College of Engineering and Technology, ZaminEndathur, Maduranthagam, Kanchipuram Dist. 6th April-2012.

Research Group Members

R.Paneerselvam, T.Marimuthu, K.P.Ganesan, M.Karthikeyan, A.AmaliRoselin, M.Mumoorthi

Faculty V

Dr. R.SUBADEVI
Assistant Professor

The diverse range of energy storage applications has spawned a multitude of special batteries such as lithium ion, lithium sulfur and sodium ion batteries each optimized for particular use. Electrolyte plays a key role in transporting the positive Lithium ion between the cathode and anode. LIB cathode materials are made up from lithium liberating compounds with various structures like spinal, layered, olivine for high power and energy density applications. In addition to a fore mentioned energy storage devices, new type of battery, Li-sulfur (Li-S) battery with high theoretical specific capacities are considered as another option. Moving from traditional cathode to sulfur has many merits beside high capacity such as low cost, safety operating voltage, and non-toxicity. Sodium ion batteries are considered as a top alternative to LIBs for large scale renewable energy storage units due to their low cost and the abundance. They are non-toxic, exhibit suitable redox potential and show similar intercalation chemistry to that of Lithium.

Area of Research/Specialization:

- **Solid State Ionics**
- **Lithium Battery Electrodes and Electrolytes**
- **Sodium and Sulfur battery electrodes**
- **Fuel Cells**
- **Biodiesel**

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	57
No. of papers presented in Conferences	:	75
h-index	:	10
i-10 index	:	11
Total Citations	:	791
Patents Granted/Filed	:	Nil

Awards and Recognitions

- **Dr.Mohan's Best Teacher Award** from The Foundation of Dr.Mohan, at TamilNadu College of Education, Nainarpuram, Karaikudi on 18.8.2011.

Research Group Members

C.Kalaiselvi, P.Rajkumar, V.Meenakshi, M.Shanthi,K.Diwakar, V.Priyanka, P.Arjunan, M.Kouthaman, K.Kannan

Faculty VI

Area of Research/Specialization:

Dr. M.RAMESH PRABHU
Assistant Professor

Major ongoing research work is proton conducting polymer electrolyte synthesis and structural design. To prepare a proton conducting polymer electrolyte is used for Fuel Cell application (Direct Methanol Fuel Cell and High Temperature Fuel Cell) and also preparing a perovskite Nano materials for High Temperature PEM Fuel cell application.

- **Solid State Ionics,**
- **Fuel Cells,**
- **Batteries,**
- **Nanocomposites**

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	41
No. of papers presented in Conferences	:	36
h-index	:	09
i-10 index	:	08
Total Citations	:	313
Patents Granted/Filed	:	Nil

Awards and Recognitions

- RFSMS Fellow during 2008 to 2010

Research Group Members

K. Selvakumar, M.Prabhakaran, G.Sowmya, J.Kalaiselvimary, P.Martina, M.Raja, S. Ponmani, S.Edwinraj.

Past Members

- P. Pradeepa, Teaching Asst., Alagappa University, Karaikudi

Faculty VII

Dr. R.YUVAKKUMAR
Assistant Professor

Area of Research/Specialization:

Overall research interest is centered on the development of nanomaterials and explores their potential applications for water splitting, supercapacitors, and biosensors applications.

- **Supercapacitors, Water splitting, Nanomaterials, Thin Films**

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	96
No. of papers presented in Conferences	:	25
h-index	:	17
i-10 index	:	28
Total Citations	:	1016
Patents Granted/Filed	:	02/03

1. Sun Ig Hong, Suresh, J., **Yuvakkumar, R.,** A. Joseph Nathanael., and Sundrarajan, M., Method for Manufacturing ZnONanopowder and ZnONanopowder Manufactured by the Method, Korean Patent Number 10-1617994, Registration No.:1016179940000 Registration Date : 2016.04.27.
2. Rajendran, V., Kannan, N., **Yuvakkumar, R.,**Elango V. and Manivasakan, P. A novel approach to prepare crystalline nano molybdenum particles, Indian Patent Ref. No.: 218/CHE/2009 dt. 30.01.2009, Journal No. 33/2010; Publication Date: 13/08/2010.
3. Rajendran, V., Suryaprabha, R., ShanmugaPriya, D. and Yuvakkumar, R., P. TiO_2 and Neem Doped Chitosan - Hydroxypropyl Methylcellulose Nanocomposite Films for Food Packaging Applications, Indian Patent Ref. No.: 736/CHE/2014 dt. 17.02.2014. Journal No. 33/2010; Publication Date: 21/08/2015.
4. Sundrarajan, M., Sun Ig Hong, Suresh, J., **Yuvakkumar, R.,** and Rajiv Gandhi, R. Bioinspired metal oxide nanopowders for biomedical applications, Indian Patent Ref. No.: 3557/CHE/2014 dt. 20.07.2014. Journal No. 33/2010; Publication Date: 01/07/2016.
5. Rajendran, V., Kannan, N., and Yuvakkumar, R., Influence of nano silica on the growth and yield of maize crop, Indian Patent Ref. No.: 1135/CHE/2009 dt. 18.05.2009, Journal No. 33/2010; Publication Date: 25/03/2016.

Awards and Recognitions

1. **Brain Korea Research Fellowship,** National Research Foundation, South Korea
2. **Senior Research Scientist,** University of Science and Technology, South Korea

Research Group Members

B.Saravanakumar, B.JansiRani

Past Members

Faculty VIII

Area of Research/Specialization:

Crystal growth has prominent role to play in the era of immense technological excellence attributing to the usefulness of many crystals in important areas of service to the humanity namely science, medicine, engineering, technology and also strategic areas of defence and space science. Many crystals be as useful as elements in piezoelectric, accousto-optic, photo-refractive, photo-elastic, elasto-optic applications and also as radiation detectors, laser hosts, parametric amplifiers, transducers, harmonic generators, Bragg cells etc., Nonlinear optics (NLO) is the study of interaction of intense electromagnetic field with materials to produce modified field that is different from the input field, phase, frequency or amplitude. The organic materials are most often based on π-conjugated molecules (chromophores) with strong electron donor and acceptor groups at the ends of the π-conjugated structure. Such molecules must be ordered in an acentric manner in a material to achieve a macroscopic NLO response.

- **Crystal Growth (Nonlinear and Ferroelectric Materials)**
- **Thin Films**

Achievements made in Teaching/Research/Extension

No. of Research Publications	:	43
No. of papers presented in Conferences	:	30
h-index	:	09
i-10 index	:	08
Total Citations	:	191
Patents Granted/Filed	:	Nil

Awards and Recognitions

Nil

Research Group Members

S.Muniyasami

Past Members
