







MURALIDHAR G. CHOURASHIYA

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Work: : Dept. of Mater. Sci. and Eng., Guangdong Technion Israel Institute of Technology (GTIIT), Shantou, China.

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POST-DOCTORAL RESEARCH EXPERIENCE AND EMPLOYMENTS:


2019-Dec – till date... GUANGDONG TECHNION – ISRAEL INST. OF TECH. (GTIIT), CHINA

Postdoctoral research fellow in Surface Engineering and Corrosion Group,

Department of Materials science and Engineering

❖ Materials for electrochemical applications and their characterizations using DEMS, TDS, etc..

- Purchasing chemicals and equipment/instruments to setup the lab.

 Teaching assignments: as Grading Teaching Assistant


Spring 2020: "314532 – Electrochemistry, Corrosion & Corrosion Protection" &

"315017 – Finishing Processes and Electrolytic Coating".

Autumn 2020: "314532 – Electrochemistry, Corrosion & Corrosion Protection".

Spring 2021: "315017 – Finishing Processes and Electrolytic Coating".

2019-Feb –2019-Nov Submission of proposals/applications for grants/faculty-positions and received an Appointment letter, from the Guangdong Technion – Israel Institute of Technology (GTIIT), China in October 2019.

 LabVIEW NXG Core 1 and Core 2 course by National Instruments & August 2019

 LabVIEW Core 3 course by National Instruments via SDU, Denmark July 2019


2017-Oct – 2019-Jan UNIVERSITY OF SOUTHERN DENMARK (SDU), DENMARK.

Postdoc researcher in Electrochemical Energy Conversion and Functional materials

(EECFM) group, Dept. of Chem. Eng., Biotech. & Environmental Tech.

❖ Developed support materials for Pt based ORR catalyst for PEM based fuel cell

- Developed graphite & oxide supported Pt as durable ORR catalyst for PEM based fuel cell
- Developed an XRF based protocol for TF-RDE characterization for reproducible measurements
- Developed a method to recover the Pt from *used-up* fuel cell stack as a fresh Pt/C catalyst
- Automated (LabVIEW) the TF-RDE characterization technique to characterize the ORR catalysts
 - Automation of the protocols by controlling instruments, data logging and data analysis/report

 Supervised ONE (01) research project of one (01) master student

➤ Probing the electrolyte/electrode interface of half-cells using EIS 2018-2019

 LabVIEW core 2 – course by National Instruments at SDU, Denmark Nov 2018

2016-Dec – 2017-Oct Submission of proposals for various grants/faculty-positions and received an offer, from the University of Southern Denmark (SDU), Denmark in July 2017.


2014-Dec – 2016-Nov INSTITUTE OF CHEMICAL RESEARCH OF CATALONIA (ICIQ), SPAIN

Postdoc researcher (Marie Curie fellow) in Heterogeneous catalysis and In-Situ/Operando Spectroscopy lab

❖ Developed electrodes for PEM based water electrolyzer & their hardware for H₂ production

- Developed porous alumina supported nanostructured IrO₂ anode for PEM water electrolyzer
- Collaborated for XAS *in-situ* investigation of Co₃O₄ based cathode for PEM water electrolyzer
- Designed/developed (SolidWorks) and fabricated the square/circle geometry electrolysis cell
- Developed the electrolysis evaluation performance tool (EEPT) for evaluation designed cell
 - Automation of cell-operation by controlling instruments, data logging and data analysis/report

 LabVIEW core 1 – course by National Instruments at ICIQ, Spain May 2015

 Training on technology transfer by ISIS Innovation, UK at ICIQ, Spain April 2016

2013-Nov – 2014 Nov Submission of proposals for various grants/faculty-positions and received offers, from Middle East Technical University (Turkey), Tomsk Polytechnic University (Russia) and Institute of Catalonia of Chemical Research (ICIQ, Spain till July 2014.

2010-Oct – 2013-Oct CHONNAM NATIONAL UNIVERSITY (CNU), SOUTH KOREA

Postdoc researcher at Materials Electrochemistry lab, Dept. of Material Sci. & Eng.

- ❖ Developed Mg-based materials for application of solid-state hydrogen storage
 - Developed hydriding combustion synthesis technique to synthesize nanocrystalline Mg hydrides
 - Designed (SolidWorks) the hybrid modular H₂ storage tank with auxiliary heating/cooling
 - Designed the test-stand to evaluate the performance of synthesized materials and designed tank
 - Collaborated in development of GeO₂/C core-shell type materials for electrodes of Li-ion batteries
- 👤 Supervised THREE (03) research projects of three (03) master students
 - Ti-Cr-V alloy co-doped with Fe and Mn for Ni-MH batteries 2012-2013
 - NAFION coated Mg-Ni for Ni-MH batteries, and 2011-2012
 - Ti-Cr-V alloy doped with Fe for Ni-MH batteries 2010-2011

PRE-DOCTORAL RESEARCH EXPERIENCE AND FELLOWSHIPS:

2008-Oct – Sept 2010 CSIR-Senior Research Fellowship (CSIR-SRF) at Department of Physics

The fellowship awarded by CSIR (Government of India), New Delhi

- ❖ Research on materials for solid oxide fuel cells (SOFCs).
 - Evaluation of Gd-doped ceria deposited on Ni-Gd doped ceria as half-cell for SOFC
 - Synthesis of Gd-doped ceria thin films by spray pyrolysis, on the porous anode (Ni-GDC)
 - Synthesis/characterization of porous 'NiO-Gd doped ceria', as SOFC anode precursor

2008-Oct – Sept 2010 Junior/Senior Research Fellowship (J/SRF) at Department of Physics

J/SRF on a DRDO, New Delhi (Government of India) funded project.

- ❖ Research on oxygen ion conductors (OICs)
 - Optimization of Gd doping in ceria for maximum oxygen ionic conductivity
 - Investigation on the synthesis of 'Gd-doped ceria' dense thin films by spray pyrolysis

2004-Jun – 2004 July Institute for Plasma Research (IPR), Gandhinagar, Gujarat, India

Summer school trainee at Radio Frequency (RF) Group

Project: Designing of a broadband coaxial dc-break in an energy transmission line using ANSOFT.

EDUCATION:

2007-Jan – 2010-Apr Ph.D. in Physics, SHIVAJI UNIVERSITY, KOLHAPUR, INDIA

- 📖 Thesis: Studies on synthesis & characterization of Gd-doped ceria as solid electrolyte
- ❖ R&D on materials for Solid Oxide Fuel Cells (SOFCs)
 - Ceramic thin films, nanocrystalline ceramic powders, and powders by ceramic routes
 - Gadolinium-doped ceria (Ce_xGd_{1-x}O_{2-d} – GDC) as a solid electrolyte
 - Nano-crystalline oxides and their composites: Ni-based cermet; La_xSr_{1-x}Co_yFe_{1-y}O composite
- 👤 Supervised EIGHT (08) research projects for 13 master students (projects/student(s))
 - Analysis of impedance spectra using Mathematica 2009-2010
 - Optimizations of NiO-GDC composite as anode for IT-SOFC 2009-2010
 - Synthesis and characterization of LaSrCoFeO₃ as a cathode for SOFC 2009-2010
 - Synthesis and characterization of NiO - GDC by solid state reaction 2008-2009
 - Synthesis of NiO-8% YSZ thin films using spray pyrolysis 2008-2009
 - Synthesis and characterization of Gd-doped ceria by combustion method 2007-2008
 - Synthesis and characterization of GDC by solid state reaction 2006-2007
 - Synthesis of boron nanoparticles 2005-2006
- 👤 Teaching assignments

Lectures on 'fuel cells' to a class of >10 M.Sc. students (for 'Energy science' specialization)
Lab-instructor for 'Reversible fuel cell' and 'Gas-chromatography' experiments

2003-Jun – 2005-May M.Sc. in Physics, SHIVAJI UNIVERSITY, KOLHAPUR, INDIA

- 📖 Thesis: Low-temperature deposition of tin oxide thin films by SILAR method and to study the effect of indium doping on its electrical and optical properties
- ❖ Specialization: Solid State Physics **SCORE: 65.17%**
 - Other subjects: Computational methods & programming, Expt. Techniques

2000-Jun – 2003-May B.Sc. in Physics, SHIVAJI UNIVERSITY, KOLHAPUR, INDIA

Willington college, Sangli affiliated to SHIVAJI UNIVERSITY, KOLHAPUR

- ❖ Main subject: Physics **SCORE: 73.60%**

- Other subjects: Mathematics, Statistics, Electronics, and English

PUBLICATIONS: (22 documents, *Citations / h-index:* Google Scholar = 533 / 11, Scopus = 419 / 10)

1. Solution combustion synthesized ceria or alumina supported Pt as cathode electrocatalyst for PEM fuel cells, *Materials Chemistry and Physics* 242 (2020) 122444.
2. Different enhancement mechanisms of the anodizing Al-doped or Sn-coupled Ti₃SiC₂ for the photoelectrochemical performance, *Chemistry Select* 5 (2020) 1496-1505.
3. Accurate determination of catalyst loading on glassy carbon disk and its impact on thin film rotating disk electrode for oxygen reduction reaction, *Analytical Chem*, 90 (2018) 14181–14187.
4. Cobalt oxide-based materials as non-PGM catalyst for HER in PEM electrolysis and in situ XAS characterization of its functional state, *Catalysis Today*, 336 (2019) 161-168.
5. Low-cost graphite as durable support for Pt-based cathode electrocatalysts for proton exchange membrane-based fuel cells, *International Journal of Hydrogen Energy*, 43 (2018) 23275-23284.
6. Solution combustion synthesis of highly dispersible and dispersed iridium oxide as an anode catalyst in PEM water electrolysis, *Journal of Materials Chemistry A*, 5 (2017) 4774–4778.
7. Electrochemical Performance of GeO₂/C Core-Shell based Electrodes for Li-ion Batteries, *Electrochimica Acta* 116 (2014) 203–209.
8. Hydrogenation and microstructural properties of hydriding combustion synthesized MgNiC composite ball-milled with NbF₅ catalyst, *Journal of Alloys and Compounds* 584 (2014) 47–55.
9. Hydrogen storage and electrochemical properties of the Ti_{0.32}Cr_{0.43-x-y}V_{0.25}Fe_xMn_y (x = 0~0.055, y = 0~0.080) alloys and their composites with MmNi_{3.99}Al_{0.29}Mn_{0.3}Co_{0.6} alloy, *Journal of Alloys and Compounds*, 566 (2013) 37–42.
10. Electrochemical performance of NAFION coated electrodes of HCSed MgNi based composite hydride, *Materials Letters* 93 (2013) 81-84.
11. Synthesis of highly active Mg-based hydrides using hydriding combustion synthesis and NbF₅ additives, *Functional Materials Letters*, 5/3 (2012) 1250025:1–4.
12. Effect of the preparative parameters of hydriding combustion synthesis on the properties of Mg-Ni-C as hydrogen storage material, *Int. Journal of Hydrogen Energy*, 37 (2012) 4238–4245.
13. Hydrogen storage and electrochemical characteristics of Ti_{0.32}Cr_{0.43-x}V_{0.25}Fe_x (x = 0 ~ 0.08) alloys and its composites with LmNi_{4.1}Al_{0.25}Mn_{0.3}Co_{0.65} alloy, *J of Alloys and Compounds*, 513 (2012) 566-572.
14. Comparison of commercial and hydriding-combustion-synthesized Mg–hydride, *Materials Letters*, 66 (2012) 42-45.
15. Synthesis and characterization of 10%Gd doped Ceria (GDC) deposited on NiO-GDC anode grade-ceramic substrate as half-cell for SOFC, *Int Journal of Hydrogen Energy*, 36 (2011) 14984-14995.
16. Synthesis and characterization of electrolyte-grade 10%Gd doped ceria thin film/ceramic substrate structures for solid oxide fuel cells, *Thin Solid Films*, 519/2 (2010) 650-657
17. Fabrication of 10%Gd doped ceria (GDC)/NiO-GDC half-cell for low or intermediate temperature solid oxide fuel cells using spray pyrolysis, *Journal of Solid-State Electrochemistry*, 14 (2010) 1869–1875.
18. Synthesis and characterization of nano-crystalline Ce_{1-x}Gd_xO_{2-x/2} (x = 0–0.30) solid solutions, *Journal of Alloys and Compounds*, 506 (2010) 739 –744.
19. Synthesis of nano-crystalline Gd-doped Ceria by combustion technique, *Journal of Alloys and Compounds*, 470 (2009) 383–386.
20. Studies on structural, morphological and electrical properties of Ce_{1-x}Gd_xO_{2-x/2}, *Materials Chemistry and Physics*, 109 (2008) 39–44.
21. Synthesis and characterization of Ce_{0.9}Gd_{0.1}O_{1.95} thin films by a spray pyrolysis technique, *Applied Surface Science*, 254 (2008) 3431–3435.
22. Effect of sintering temperature on structural and electrical properties of gadolinium doped ceria (Ce_{0.9}Gd_{0.1}O_{1.95}), *Bulletin of Material Science*, 30 (2007) 97–100.

PRESENTATION/PARTICIPATION AT CONFERENCES /WORKSHOPS (selected):

- “Exploring the XRF technique as a tool to estimate the degree of leaching in alloy-catalysts used for PEMFCs”, in the general assembly of the Dansk Elektrokemisk Forening (DEF) 2018 conference organized at University of Southern Denmark, Denmark during 1-2 November 2018.
- “Investigating the single-step solution combustion method for synthesis of oxide-supported/unsupported Pt/PtO_x, as cathode electrocatalysts for PEMFCs.”, in 5th Int. Conf. on Nanotechnology, Nanomaterials & Thin Films for Energy Applications (NANOENERGY 2018) at University of Aveiro, Portugal – July 2018.
- “Accurate determination of catalyst loading on glassy carbon disk and its impact on thin film rotating disk electrode for oxygen reduction reaction.”, in 5th Int. Conf. on Nanotechnology, Nanomaterials & Thin Films for Energy Applications (NANOENERGY 2018) at University of Aveiro, Portugal – July 2018.
- Workshop on “Sample Environments for Neutron and Synchrotron studies of functional materials – SEW2018” at Sandbjerg, Denmark – May 2018.

- “Synthesis of high-surface-area iridium oxide using solution combustion synthesis”, in Advanced Energy Materials (AEM) – 2016, University of Surrey, Guildford, England – September **2016**.
- “In-house design and fabrication of electrochemical membrane reactors for various in-situ hydrogenation reactions”, in Japan-Spain Joint Symposium on Heterogeneous Catalysis, Tarragona, Spain – June **2015**.
- “Microstructural development of hydriding combustion synthesized MgNiC composite while mixing with NbF₅/catalyst by ball-milling & their hydrogenation kinetics” 5th World Hydrogen Technologies Convention (WHTC), Shanghai, China – Sept. **2013**.
- “Microstructural and hydrogenation properties of hydriding combustion synthesized Mg-Ni-C and NbF₅ added composite”, 3rd International Colloids and Energy Conference, Xiamen, Fujian, China – April **2013**.
- "Effect of preparative parameters of hydriding combustion on properties of Mg-Ni-C hydrogen storage alloy", International Conference on Nano Science and Nano Technology (ICNST), Suncheon National University, Sunchon, South Korea – November **2011**.
- “Fabrication of 10%Gd doped ceria (GDC)/NiO-GDC half-cell for low or intermediate temperature solid oxide fuel cells using spray pyrolysis”, In 5th International Conference on Materials for Advanced Technologies (ICMAT), Suntec Singapore Int. Convention & Exhibition Centre, Singapore – July **2009**.

RECOGNITION, AWARDS, GRANTS, and MEMBERSHIPS:

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|----------------------------|---|
| 2018-July | Session-chair, Nano Energy-session , 5 th Int. Conf. on Nanotech., Nanomaterials & Thin Films for Energy Applications, organized at University of Aveiro, Portugal |
| 2017-Oct | Advances in Engineering (Canadian research news portal– https://advanceseng.com) highlighted research published in Journal of Materials Chemistry A (2017). |
| 2016-Sept | Session-chair, Hydrogen Energy-session , Advanced Energy Materials (AEM) 2016 conference organized at University of Surrey, Guildford, England |
| 2016-Sep – 2016-Oct | Member of organizing committee of the 1st BIST Postdoc Day ICIQ representative in organizing committee of 1st BIST Postdoc Day |
| 2010-Dec | Best research paper award , 3rd National Symposium for Materials Research Scholars organized by and at IIT Bombay, Mumbai, India. |
| 2009-Jun | Travel Grant via DST-ITS , to attend ICMAT Conference at Singapore by Department of Science & Technology (DST), New Delhi (Government of India) |
| 2009-Mar | Best Oral Presentation , in National Symposium on Nano-materials and Application organized by Fergusson College, Pune, India |
| 2008-Mar | TOP 25 Hottest Articles in Material Science , article published in Materials Chemistry and Physics for the duration from January to March 2008 by Elsevier. |

PEER REVIEW SUMMARY till March 2020 (<https://publons.com/a/1011346>):

Performed 14 reviews for journals; located in 81st percentile for verified review contributions on PUBLONS.

| No. of articles | Name of Journal | Year (articles) |
|-----------------|--|--|
| 1 | Electrochimica Acta | 2018 (1) |
| 6 | Journal of Alloys and Compounds | 2019 (1), 2018 (1), 2016 (2), 2013 (2) |
| 3 | Materials Science and Engineering B | 2017 (3) |
| 2 | Materials Letters | 2017 (2) |
| 1 | Metals and Materials International | 2011 (1) |
| 1 | International Journal of Hydrogen Energy | 2020 (1) |