

## Deepak Sharma, PhD

4<sup>th</sup> Main, KGE Layout, New Bel Road

Bangalore, India, 560094

Email: dsharma7309@gmail.com

Phone: (+91) 8861544361

Webpage: <https://sites.google.com/site/deepaksharmadehra/>

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### SUMMARY

PhD candidate trained in mechanical behavior of materials with special expertise in the following areas:

- Fracture Mechanics
- Thermal Interface Materials
- Experimental Design
- Data Analysis
- CAD and Finite Element Method
- Experimental Characterization

### EDUCATION

#### Indian Institute of Science

Bangalore, KA, India

Ph.D with MSc(Engg.), Materials Engineering, CGPA 6.3/8

April 2018

- Ministry of Human Resource Development (MHRD) Research Fellowship

#### National Institute of Technology

Hamirpur, HP, India

B.Tech., Mechanical Engineering, CGPA 7.61/10

May 2011

### RESEARCH EXPERIENCE

#### Indian Institute of Science, Department of Materials Engineering

Bangalore, KA

##### ➤ Ph.D. Student

August 2012 - July 2017

Supervisor: Dr. Praveen Kumar

PhD Project: Synergistic effect of electromagnetic forces on the failure of pre-cracked thin metallic structures

- Finite element method (FEM) simulations were conducted showing fracture can occur due to electromagnetic forces.
- Designed custom-built fixture to investigate fracture in thin foil under electric current and mechanical loadings.
- Experiments successfully showed fracture due to self-induced electromagnetic forces which validated FEM results.
- Identified fracture mechanism due to electromagnetic forces through microstructural characterization (SEM, EDX).

##### ➤ Senior Research Associate

August 2017 -present

- Characterization and development of (CNT or rGO)-Cu-In based new generation thermal interface materials.
- FEM analysis of the effect of electric field on the mechanical behavior of CNT foams.
- FEM analysis of the effect of electric current crowding in the bleach structure used to study electromigration.

### TEACHING EXPERIENCE

#### Indian Institute of Science, Department of Materials Engineering

Bangalore, KA

##### Teaching Assistantship

###### Mechanical Behaviour Lab

Fall 2015

- Conducted tension test for undergraduate students (Class of 30 students).
- Graded lab files and conducted lab examination.

###### Mechanical Behaviour Course

Fall 2014

- Conducted Mechanical Behaviour Course tutorials for graduate students (Class of 30 students)
- Graded quiz and conducted examinations.

### TECHNICAL SKILLS

- Computer aided design : AutoCAD, Solid Edge, Solid Works
- FEM and mathematics tools: COMSOL, ANSYS, ABAQUS, MATLAB
- Experimental characterization: SEM, TEM, EPMA, XRD, EDX, RAMAN SPECTROSCOPY

## INTERNSHIPS AND WORKSHOPS

- Goa Shipyard Ltd., Jun-Jul 2009, Goa, India
- Western India Shipyard Ltd., Jun-Jul 2010, Goa, India
- Workshop on COMSOL Multiphysics, December, 2012, Bangalore, India
- Workshop on COMSOL Multiphysics, January, 2015, Bangalore, India

## REFEREED PUBLICATIONS

1. **D. Sharma**, S. B. Reddy, and P. Kumar, "Electromagnetic force induced fracture of pre-cracked thin metallic conductors," *International Journal of Fracture*, <https://doi.org/10.1007/s10704-018-0299-2>, 2018.
2. **D. Sharma**, S. B. Reddy, and P. Kumar, "Fracture of Pre-Cracked Metallic Conductors under Combined Electric Current and Mechanical Loading," *International Journal of Fracture*, <https://doi.org/10.1007/s10704-018-0298-3>, 2018.
3. **D. Sharma**, A. Jain, N. Somaiah, R. Sharma, P.R. Narayanan, P. Kumar, "Effect of Embedding Cu-Graphene Hybrid Powder into 2-Phase In-Cu Solders on Its Suitability as Metallic Thermal Interface Material" *Journal of Electronic Materials*, 47, Issue 8, pp 4863–4874, 2018.
4. **D. Sharma**, R.K. Tiwari, R. Sharma, P.R. Narayanan, P. Kumar, "Two-Phase Metallic Thermal Interface Materials Processed through Liquid Phase Sintering followed by Accumulative Roll Bonding," *IEEE Trans. Compon. Pack.*, 6, Issue 1, pp 58–66, 2015.
5. N. Somaiah, **D. Sharma**, P. Kumar, "Electric Current Induced Forward and Anomalous Backward Mass Transport" *Journal of Physics D Applied Physics*, 49 20LT01, 2016.
6. Sil, A. A. Wagh, **D. Sharma**, R. Ranjan, and P. Anil Kumar, "On the inter-layer magneto-electric coupling in BiFeO<sub>3</sub>/SrRuO<sub>3</sub> heterostructure," *Applied Physics Letters*, vol. 111, p. 102902, 2017.
7. P. Jagtap, S. K. Reddy, **D. Sharma** and P. Kumar, "Tailoring Energy Absorption Capacity of CNT Forests through Application of Electric Field" *Carbon*, vol. 95, pp 126-136, 2015.

## CONFERENCES

1. **D. Sharma** and P. Kumar, "Synergistic Effect of Electromagnetic Forces On the Fracture of Pre-Cracked Thin Metallic Structures" *14th International Conference on Fracture (ICF 14)*, Rhodes, Greece, 18th-23rd June 2017.
2. **D. Sharma** and P. Kumar, "Transition of sharp crack propagation to blow hole formation in a pre-cracked thin conductor under short duration electric current pulses" *NMD-ATM*, Goa, India 11<sup>th</sup> - 14<sup>th</sup> November, 2017 (**Best contributory presentation award**).
3. **D. Sharma** and P. Kumar, "Graphene Nano-Sheet Cu Embedded 2-Phase In-Cu Solders as Next Generation Thermal Interface Materials" *IUMRS-ICYRAM*, IISc, Bangalore, India, 11<sup>th</sup>-15<sup>th</sup> December, 2016.
4. **D. Sharma**, R.K.Tiwari and P. Kumar, "A Novel Two Step Processing Route for Fabricating 2-Phase Metallic Thermal interface Materials" *IIM-NMD-ATM*, Coimbatore, 13<sup>th</sup>-16<sup>th</sup> November, 2015.

## PERSONAL DETAILS

Sex: Male  
Date of Birth: February 09, 1989  
Marital Status: Married  
Nationality: Indian