Soud F Choudhury

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My career objective is to harmonize educational knowledge and practical experience to serve the needs of my institution and lead it to success

Interested In

Microelectronics packaging and interconnects reliability
Semiconductor device manufacturing
Finite Element Analysis (FEA)
Thermal management of Microelectronics System
Mechanical Testing of Materials
Materials characterization

Education

PhD Degree in Mechanical Engineering *(Dec, 2015)*
University of Connecticut
CGPA: **3.84/4.0**

BSc Degree in Mechanical Engineering *(Feb, 2011)*
Bangladesh University of Engineering & Tech
CGPA: **3.74/4.0**

Work Experiences

Graduate Research Assistant (GRA) (Aug, 2012- Present)
University of Connecticut

- Specimen fabrication & test environment setup for thermo-mechanical fatigue testing of microelectronic packages.
- Design of Experiment (DoE) development.
- FE analysis of electronic packages' performances and mechanical behavior of interconnects under thermal cyclic loading.
- Constitutive modeling of materials behavior using Crystal Plasticity Finite Element Methods (CPFEM).
- Characterization using nanoindentation, Scanning electron microscopy (SEM) and Electron backscatter diffraction (EBSD).
- Mentor undergraduate students and guide them to perform research.
- Lab media manager.

Mechanical Engineer Intern (June, 2011- May, 2012)
Relisource Inc

- Mechanical engineering design analysis on customer products.
- Failure analysis of consumer products using finite element software.
- Product design using CAD software.
- Software quality assurance.

Skills

Engineering Software Skills
SolidWorks, AutoCAD, Abaqus, ANSYS, Matlab, Simulink, Channel 5 HKL, Surface Evolver

Other Software
Microsoft Office Suite, Minitab, Adobe Photoshop, Adobe Illustrator, Corel Draw

Programming Language Skills
C/C++, FORTRAN, HTML

Experimental Skills
SEM, EDX, EBSD, Nanoindentation, Optical Microscopy, *In situ* mechanical testing of materials

Honors/Awards

- Awarded travel grants for presenting poster in ASME InterPACK 2013 conference in Burlingame, CA.
- Deans award for outstanding results in Junior and senior undergraduate years.
- Government scholarship for outstanding results in board examinations.

Projects

Specimen Fabrication & Test Setup for Thermo-Mechanical Fatigue Testing of Micro-Bumps in Microelectronics

The study is conducted to experimentally observe the intermetallics (IMCs) effect on the micro-bumps reliability in thermal cyclic loading. A unique test specimen is designed and will be fabricated. Manufacturing parameters such as reflow time and temperature effect on bump morphology are targeted to be monitored during specimen fabrication.

In situ Single Lap Shear Test of Micro Scale Solder Joints

Single lap shear test will be conducted in a 20-30μm thick solder joint to capture the shear behavior of solder joint with different amount of intermetallic thickness. Lap shear specimen is designed and will be fabricated. Fabrication parameters will be controlled to achieve desired surface morphology in solder joint. A Micro tensile stage will be used to conduct the test to observe the effect of IMCs on the mechanical behavior of micro solder bonds.

Thermo-Mechanical Fatigue Reliability Test Simulation for Micro-Bumps in Microelectronics Packaging

The project aims to observe the effect of intermetallics (IMCs) presence on the fatigue life cycles in microelectronic packages. Commercial finite element analysis software ANSYS APDL programming is used to simulate the effect of the IMCs' presence in the micro solder bump with 30μm standoff height.

Single Crystal Plasticity Finite Element Analysis (CPFE) of Cu_6Sn_5 Intermetallic

Plasticity of a material is defined by the slip system parameters which are unavailable for Cu_6Sn_5 in literature. A comparative method based on nanoindentation test and crystal plasticity finite element analysis was used to predict the critical resolved shear stress, initial hardening modulus and saturation stress of Cu_6Sn_5 that can imitate the plastic behavior of single crystal Cu_6Sn_5. Abaqus software with user material (UMAT) support has been utilized.

Elastic-plastic Properties Determination of Cu_6Sn_5 Intermetallic Using Nanoindentation and Electron Backscatter diffraction (EBSD) analysis

This study was conducted to fully characterize Cu_6Sn_5 IMC using nanoindentation. Elastic properties (Young's modulus & Hardness) was extracted directly from nanoindentation and a reverse analysis model proposed by Dao was used to predict the plastic properties (yield strength, strain hardening exponent) of the IMC. EBSD analysis was used to observe the preferred grain growth orientation of Cu_6Sn_5.

Publications

[J1] **S.F. Choudhury**, and L. Ladani, "Single Crystal Plasticity Finite Element Analysis of Cu_6Sn_5 Intermetallic", Metallurgical & Materials Transaction A, *Accepted, (in press)*.

[J2] **S.F. Choudhury**, and L. Ladani, " Effect of Intermetallic Compounds on the Thermo-mechanical Fatigue Test Behavior of Micro-bumps in 3-D Microelectronic Packages", ASME J. of Electronic Packaging, *under review*.

[J3] L. Ladani, J. Razmi, and **S.F. Choudhury**, "Mechanical Anisotropy and Strain Rate Dependency Behavior of Ti6Al4V Produced Using E-Beam Additive Fabrication", J. of Engg. Mat. & Tech, ol 136, 2014. **Link**

[J4] **S.F. Choudhury** and L. Ladani, "Grain Growth Orientation and Anisotropy in Cu_6Sn_5 Intermetallic: Nanoindentation and Electron Backscatter Diffraction Analysis," J. of electron. mat., vol 43(4), pp. 996-04, 2014. **Link**

[J5] L. Ladani, E. Harvey, **S. F. Choudhury** and C. Taylor, "Effect of Varying Test Parameters on Elastic-plastic properties Extracted by Nanoindentation Tests," Experimental mechanics, vol 53(8), pp. 1299-09, 2013 **Link**

[C1] **S. F. Choudhury** and L. Ladani, "Experimental Observation of the Effect of Crystallographic Orientation on Mechanical Behavior of Single Crystal Cu_6Sn_5 Intermetallic" InterPACK 2013, July 16-18, 2013, Burlingame, CA, USA. **Link**