



Profile of Research in Materials Science and Engineering at the University of the Philippines College of Engineering

Dr. Alberto V. Amoroso, Jr.
Chairman, UP MMME Dept.

Program Offerings, MMME Dept. UPCOE

- BS Mining Engineering
- BS Metallurgical Engineering
- BS Materials Engineering
- MS Metallurgical Engineering
- MS Materials Science & Engineering*
- PhD Materials Science & Engineering*

**joint offering with College of Science*

MMME Faculty Members (As of AY 2004-2005)

Full Time

- 2 Associate Professors
- 5 Assistant Professors (1 study leave)
- 4 Instructors
- 1 University Researcher

Faculty Members

(As of AY 2004-2005)

Part Time

- 1 Professor Emeritus
- 3 Senior Lecturers
- 1 Lecturer
- 1 Adjunct Professor

Highest Educational Attainment of MMME Faculty

Full-time

3 Ph.D.

4 M.S.

5 B.S.

Part-time

2 Ph.D.

2 M.S.

1 MBA

1 BS

Directory of MMME Faculty

Full Time

- Dr. Alberto Amorsolo, Jr.
(Chairman)
- Dr. Herman Mendoza
- Dr. Randolph Flauta
- Prof. Eligia Clemente
- Prof. Jeffrey Venezuela
- Prof. Leslie Joy Lanticse
(study leave)
- Emilio Figueroa III
- Gay Kathrina Maniquiz
- Candy Mercado
- Mark Romano

- Noelle Easter Cruz
- Mary Donnabelle Balela

Part-Time

- Dr. Meliton Ordillas, Jr.
(Emeritus Professor)
- Dr. Manolo Mena
- Prof. Artemio Disini
(Adjunct Professor)
- Engr. Ramon Santos
- Engr. John Ivan Gonzales
- Maria Celine Alarcon

Student Population As of 2nd Sem 2004-2005 (All year levels)

| | |
|----------|-----|
| BS Mat E | 296 |
| BS Met E | 127 |
| BS EM | 55 |
| MS MetE | 4 |
| MS MSE | 32 |
| PhD MSE | 8 |
| TOTAL | 522 |

Research at UP MMME Dept

Research focus areas based on ff. criteria:

1. Expertise of faculty
2. Available funding
3. Available facilities at MMME
4. Relevance to industry
5. Chance for collaboration with universities abroad (esp. AUN/SEED-Net)

Industry-Related Research Areas

- PCB substrate processing technology
- Lead-free Solders (e.g. intermetallic formation and reliability issues)
- Thermomechanical behavior of polymer substrates
- Failure Analysis (e.g. electrochemical migration, die fracture, corrosion)

Other Research Focus Areas

- Thin films and coatings (e.g. silicide and nitride films) – synthesis and film stability
- Development of new sample preparation methods for Transmission Electron Microscopy based on soluble substrates (e.g. using styrofoam and PMMA)
- Self-Propagating high temperature synthesis to produce advanced ceramics (e.g. SiC)

Other Research Focus Areas

- Nanomaterials (e.g. Polymer-clay nanocomposites; nanograins by pulse plating)
- Novel alloys (e.g. Cu-based shape memory alloys)
- Materials degradation (polymer degradation, corrosion of metals)

Other Research Focus Areas

- Device fabrication (e.g. doping by ion shower, LPCVD of silicon nitride and polysilicon)
- Microstructure modification treatments (e.g. fracture toughening of partially-stabilized zirconia ceramics by ceria additions)

Capabilities of MMME Facilities

- **Materials Characterization** (TEM, SEMs, WDS, Thermal Analysis, XRD, Hardness, SMA, Four-point Probe, Ellipsometry, AAS)
- **Deposition of Coatings and Films** (Electroplating, Pulse Plating, Vacuum Evaporation, LPCVD, RF Magnetron, Thermal Oxidation)

Capabilities of MMME Facilities

- **Materials Forming** (Sintering, Spin Casting, Arc Melting, Swaging, Joining)
- **Device Fabrication** (Czochralski Growth, Dry Etching, Wet Etching, Ball Grinding, Spin Coating, Lithography, Doping by Ion Shower)
- **Patterning and Plating System** (for PCB manufacture)

TEM Facility at MMME



PCB Substrate Processing Laboratory

For
Education
and
Training



An Intel funded Project

Ion Shower Facility at Shono Lab



LPCVD System at Shono Lab



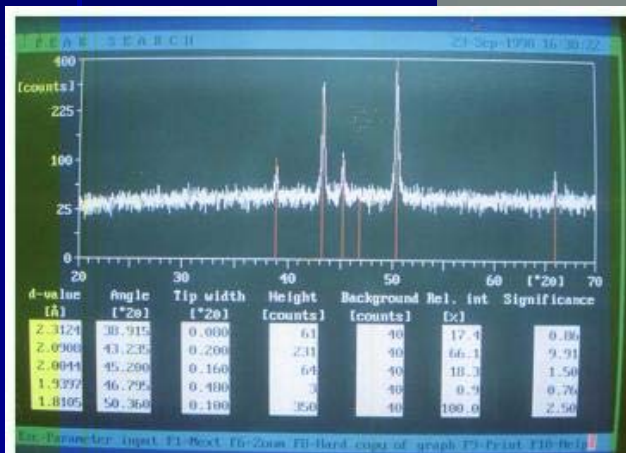
RF Magnetron Sputtering System at Shono Lab



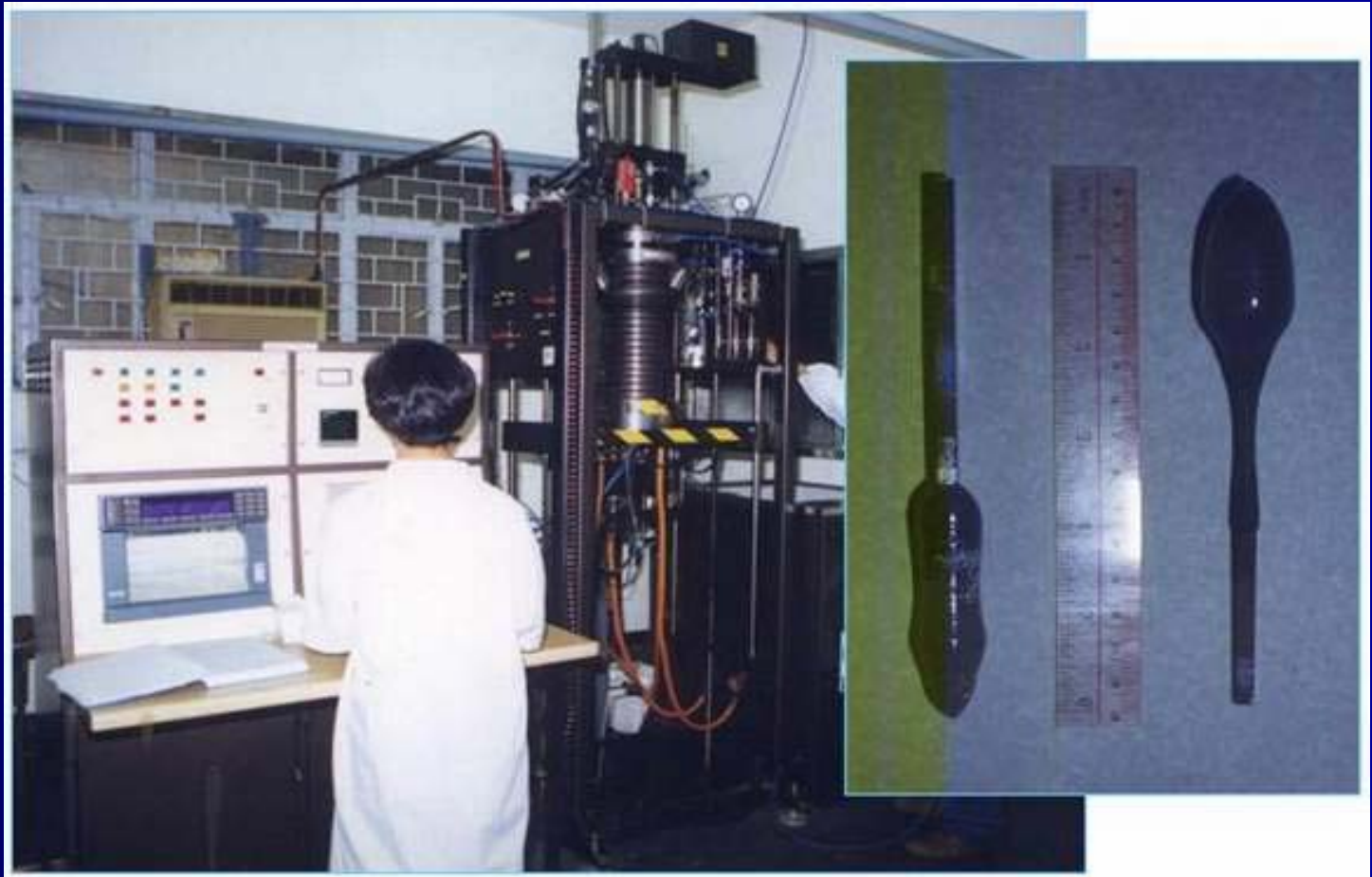
Thermomechanical Analyzer at Joeres Lab



X-ray Diffractometer at Joeres Lab



Single Crystal Grower at NEC Basement Lab



SEM-WDS System with E-beam Lithography Facility



Research Output of MMME

- Completed MS and PhD Thesis
- Completed Faculty Research Projects
- Undergraduate research projects
- Paper Presentations
- Journal Publications

Completed Masteral Thesis Studies (1999-2004)

| Year | No. |
|------|-----|
| 2004 | 4 |
| 2003 | 4 |
| 2002 | 4 |
| 2000 | 3 |
| 1999 | 3 |

Completed Doctoral Thesis Studies (1998-2004)

- Morphology, microstructure and mechanical properties of synthesized nano-sized alumina (2005)
- Hybrid formation and properties of polymer layered silicate nanocomposites (2004)
- Development of a Cu-Sn shape memory alloy (2004)
- Self-propagating high temperature synthesis (SHS) of silicon carbide (2003)

Completed Doctoral Thesis Studies (1998-2004)

- Mathematical modeling of implant dose and characterization of p-n junctions formed by ion shower technology (IST) (2000)
- Effect of annealing on the nonlinear voltage of doped ZnO polycrystalline variable resistor ceramics (1998)

Completed Doctoral Thesis Studies (1998-2004)

- Fatigue behavior and NDE characteristics of aluminum silicon-carbide metal-matrix composites using ultrasonic pulse-echo method (1998)

Paper Output involving MMME Faculty

2004

1 oral presentation (Japan)

2 poster presentations (Japan)

1 article in ATM Journal (Japan)

4 oral presentations (Thailand and Vietnam)

3 oral presentations (Philippines)

2 refereed articles (PEJ)

Paper Output involving MMME Faculty

2003

- 1 oral presentation (Vietnam)
- 1 oral presentation (Malaysia FWS)
- 1 oral presentation (South Africa)
- 1 poster presentation (South Africa)
- 5 oral presentations (SMEP Conf.)
- 3 oral presentations (Microphil Conf.)
- 2 poster presentations (Microphil Conf.)
- 2 Chapters in book (published UK)
- 1 refereed article (PEJ)

MMME Department Linkages

- Asean University Network/Southeast Asia Engineering Education Network (AUN/SEED-Net)
- Intel Technology Phils.
- SUNY-Binghamton
- Society of Metallurgical Engineers of the Philippines (SMEP)
- Philippine Society of Mining Engineers
- U.P. Alumni Engineers
- Microscopy Society of the Philippines

MMME Department Linkages

- Companies Participating in required OJT of undergraduate students (31 companies in 2004)
- DOST (PCASTRD, MIRDC, ITDI, PCARRD, PNRI)
- Commission on Higher Education
- Mindanao State University-Iligan Institute of Technology (MSU-IIT)
- Mariano Marcos State University (MMSU)
- Mapua Institute of Technology (Mapua Tech)
- De La Salle University
- Ateneo de Manila University

MMME Department welcomes opportunities for collaboration in research and the possibility of having some access to more advanced laboratory facilities abroad especially for materials characterization.

END OF PRESENTATION

Thank you for your attention!