

# *Rensselaer Physics Department Activities*

***April 2007 – June 2007***

## **HONORS AND AWARDS**

**T.-M. LU**

- “Enhanced Step Coverage of Thin Films on Patterned Substrates by Oblique Angle Physical Vapor Deposition”, T. Karabacak and T.-M. Lu, Patent No: 7,244,670 (2007).

**G.-C. WANG**

- Chaired a session in the symposium on Mechanics of composites in the era of energy and nanotechnology, Rensselaer, May 12, 2007.

**X.-C. ZHANG**

- US Patent 7,230,245: Field induced THz wave emission microscope. June 12, 2007. Awarded.
- U.S. Patent 7,239,775: High repetition rate, linear, true time of optical delay line". July 3, 2007. Awarded.
- U.S. Patent 7,242,010: GaSe crystals for broadband terahertz wave detection, July 10, 2007. Awarded.

## **INVITED TALKS**

**T.-M. LU**

- “Interface stability of metal barrier and low K dielectrics”, invited talk, Materials Research Society Spring Meeting, April 9, San Francisco, 2007.

**X.-C. ZHANG**

- “Recent development of THz wave technology for sensing and imaging applications,” seminar on Modern Optics and Spectroscopy, George R. Harrison Spectroscopy Lab., MIT, April 3, 2007.
- “Broadband THz wave photonics for defense and security applications,” plenary presentation, SPIE Defense and Security Symposium, Orlando, FL, April 11, 2007.
- “Physics, technology, & applications of THz wave photonics in

laser-induced-air-plasma”, J.M. Dai, X. Xie, N. Karpowicz, X.-C. Zhang, SURA THz Application Symposium, Washington DC, June 8, 2007.

## MEETING ATTENDANCE

S.-K. EAH

- 31<sup>st</sup> New England Complex Fluids Workshop, Providence, RI, June 15, 2007

## OTHER PROFESSIONAL TRAVEL

S.-K. EAH

- May 21-22, National Science Foundation, Arlington, VA, Reviewer of proposals at a panel review session

G.-C. WANG

- Attended IGERT director meeting on May 14 and 15, 2007 in DC.

## PRESENTATIONS (presenter in bold)

S.-K. EAH

- “One-Nanometer-Scale Size-Controlled Synthesis and 2D Self-Assembly of Monodisperse Gold Nanoparticles”, **Sang-Kee Eah** and James Ian Basham, Materials Research Society (MRS) Spring Meeting, San Francisco, CA, April 9-13, 2007.

X.-C. ZHANG

- “THz application for detection of explosives,” Jian Chen, Y.Q. Chen, and X.-C. Zhang, SafeBED, P1, poster, Annual Review of NSF CenSSIS, Northeastern University, Boston, April 20, 2007.
- “Femtosecond laser pulse propagation property in air,” Jingle Liu, X.-C. Zhang, R1-A, P9, poster, Annual Review of NSF CenSSIS, Northeastern University, Boston, April 20, 2007.
- “THz technology for proposed DHS ALERT Center of Excellence,” X.-C. Zhang, CenSSIS, Northeastern University, Boston, April 20, 2007.

## PAPERS PUBLISHED

T.-M. LU

- “Unusual magnesium crystalline nanoblades grown by oblique angle vapor deposition”, F. Tang, T. Parker, H.-F. Li, G.-C. Wang, and T.-M. Lu, J. Nanoscience and Nanotechnology 7, 1 (2007).
- “Ballistic aggregations on two-dimensional arrays of seeds with oblique angle flux”, D.-X. Ye and T.-M. Lu, Phys. Rev. B, submitted.

- "Interface stability of metal barrier and low K dielectrics", T.-M. Lu, Y. Ou, and P.-I. Wang, Mat. Res. Soc. Sym., submitted.
- "Non-local effects in thin film growth", M Pelliccione and T.-M. Lu, Modern Physics Letters B, submitted.
- "Deformation of amorphous silicon nanostructures subjected to monotonic and cyclic loading", C. Gaire, D.-X. Ye, T.-M. Lu, G.-C. Wang, and C. Picu, J. Mat. Res, submitted.
- "Enhancement of Cu(hfac)<sub>2</sub> Chemisorption on the Parylene Surface by N<sub>2</sub> Plasma Surface Modification" S. Pimanpang, Pei-I Wang, Dexian Ye, Jasbir S. Juneja, G.-C. Wang, and T.-M. Lu, J. Electrochem. Soc., submitted.
- "Effects of three-dimensional Ehrlich-Schwoebel barrier on texture selection during Cu nanorod growth", C.G. Johansen, Hanchen Huang, and T.-M. Lu, Appl. Phys. Lett., submitted.

## G.-C. WANG

- "Preferred orientation in Ru nanocolumns induced by residual oxygen", J.P. Singh, T. Karabacak, P. Morrow, S. Pimanpang, T.-M. Lu and G.-C. Wang, J. Nanosci. and Nanotechnol. 7, 2192-2196 (2007).
- "Layer thickness dependent CPP-GMR of individual electrodeposited CoNi/Cu multilayer nanowires", X.-T. Tanga), G.-C. Wang a), and M. Shima b)
  - a) Department of Physics, Applied Physics and Astronomy
  - b) Department of Materials Science and Engineering
 Rensselaer Polytechnic Institute, Troy, NY 12180-3590  
 Phys. Rev. B 75 (13) 134401-1-10 (2007).
- "Magnetic layer thickness dependence of magnetization reversal in electrodeposited CoNi/Cu multilayer nanowires", X.-T. Tang, G.-C. Wang, and M. Shima, J. of Magnetism and Magnetic Materials 309 (2) 188-196 (2007).

## X.-C. ZHANG

- "Direct observation of transition of surface plasmon resonance from photonic crystal effect," Weili Zhang, Abul K. Azad, and Jiaguang Han, Jingzhou Xu, Jian Chen, and X.-C. Zhang, Phys. Rev. Lett, **98** 183901 (2007).
- "Enhancement of terahertz wave generation from laser induced plasma," Xu Xie, Jingzhou Xu, Jianming Dai, and X.-C. Zhang, Appl. Phys. Lett. **90**, 141104 (2007)
- "Using air to detect pulsed THz waves," Jianming Dai, Xu Xie, and X.-C. Zhang, Wu Li (Chinese Physics Today), **3**, 191 (2007).

## PROPOSALS (SUBMITTED or GRANTED)

### S.-K. EAH

- Self-assembly of nanoparticles into very large two-dimensional superlattices, March 30, 2007 (submitted), \$50,000 (two years), American Chemical Society Petroleum Research Fund, As PI

#### T.-M. LU

- "Reliability of Cu-Ultra-low K systems" (white paper), T.-M. Lu and H. Bakhru, submitted to Semiconductor Research Corporation.

#### X.-C. ZHANG

- "Terahertz-Wave Emission Apparatus," Army Research Office Director Research Initiative Grant, \$300,000 (\$100k/year), 2007-2010. Awarded.
- "200 GHz millimeter wave inspection system," Lockheed Martin, \$24,999. Six months. Awarded.
- "Heterodyne 200 GHz millimeter wave inspection system," Lockheed Martin, \$50,000. 5/31/07 – 8/31/07. Awarded.
- "NATO Research Task Group SET-124/THz Wave Technology for Standoff Detection of Explosives and Other Military and Security Applications," AFOSR, 6/1/07 – 11/30/07. \$10,000. Awarded.
- "Miniature THz spectrometer," Navy SBIR Phase II under Zomega THz Corp. \$750,000. Rensselaer Share is \$200,000 for two years. Pending.
- "Spirit Arrow Composites Inspection", Spirit Arrow, \$25,000. X.-C. Zhang (PI) and Albert Redo (co-PI). Four months. 2007. Submitted.

## **SIGNIFICANT RESULTS OBTAINED OR NEW RESEARCH AFFILIATES**

### **VISITORS TO RENSSELAER**

### **NON-PROFESSIONAL ACTIVITIES**

### **IMPORTANT ACTIVITIES OF STUDENTS**

#### G.-C. WANG

- Sigma Xi induction ceremony was held on April 19, 2007. Over 20 students were inducted.
- Graduate student Xueti Tang defended his PhD on 18, 2007. He will start working for Grandis in CA.
- Postdoc and former graduate student Fu Tang won 2007 Rensselaer Lester Gerhardt Award.
- REU program started on May 30, 2007.

## **X.-C. ZHANG**

- Brian Schulkin and Jian Chen won Coherent Student Award (\$750 each) on April 25 2007.
- On May 24, 2007, NASA Glenn Research Center requested information for a pulsed and chirped THz computed tomography system (<http://prod.nais.nasa.gov/cgi-bin/eps/synopsis.cgi?acqid=124918>). This development is entirely based on two patents we developed at Rensselaer. Currently, several companies contacted THz Center for such development, including Zomega and Boeing.

## **OTHER**