

## Nozomu Tsuboi, Ph.D.

Professor

Program: Advanced Materials Science and Technology

Area: Materials Science and Technology

Undergraduate: Dept. of Engineering

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### Professional Expertise

His professional expertise encompasses materials science and engineering, mainly related to optoelectronic application such as light-emitting and photovoltaic devices. His special emphasis places on compound semiconductors of chalcopyrite-type sulfides, delafossite-type oxides, and their related materials. He and his group succeeded in preparing thin films and crystals of  $\text{CuInS}_2$ ,  $\text{CuAlGaS}_2$ ,  $\text{AgAlGaS}_2$ ,  $\text{CuAlO}_2$ ,  $\text{CuYO}_2$ ,  $\text{ZnO}$ , etc. by multisource-evaporation method, magnetron-sputtering method, vapor-phase-epitaxy, solution-method, and solid-state-reaction.

### Education

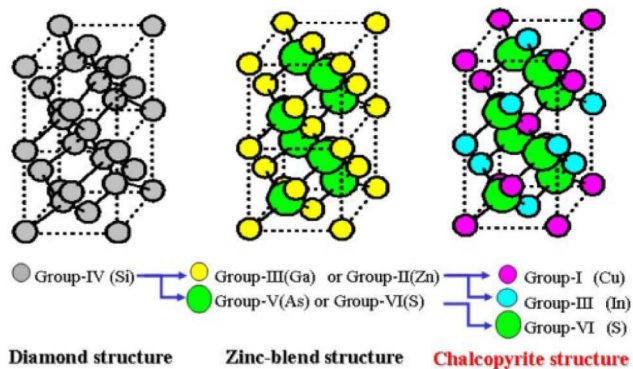
1989: Ph. D., Niigata University, Japan

1986: M. Eng. Niigata University, Japan

1984: B. Eng. Niigata University, Japan

### Professional Societies and Activities

1. The Japan Society of Applied Physics
2. The Institute of Electronics, Information and Communication Engineers of Japan
3. The Institute of Electrical Engineers of Japan
4. Associate Editor: The Japanese Journal of Applied Physics (2010/4- )
5. Organize committee



Multinary semiconductors are valuable in finding new functional characteristics, which cannot be found in IV, III-V, II-VI semiconductors, because of the diversity in possible combinations of elements.

### Major Publications

- [1] Epitaxial Growth of Chalcopyrite  $\text{CuInS}_2$  Films on  $\text{GaP}(001)$  by Controlling  $[\text{Cu}]/[\text{In}]$  Ratio, Reynaldo Magdadaro Vequizo<sup>1,2</sup>, Nozomu Tsuboi<sup>1,3,4</sup>, Satoshi Kobayashi<sup>3</sup>, Koichiro Oishi<sup>5</sup> and Futao Kaneko, *Phys. Stat. Sol. (c)*, Vol. 6, No.5, pp.1019-1022, 2009.
- [2] Preparation of Delafossite-type  $\text{CuYO}_2$  Films by Solution Method, N. Tsuboi, K. Tosaka, S. Kobayashi, K. Kato and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 47, No. 1, pp.588-591, 2008.
- [3] Characterization of  $\text{CuAlO}_2$  Thin Films Prepared on Sapphire Substrates by Reactive Sputtering and Annealing, N. Tsuboi, T. Moriya, S. Kobayashi, H. Shimizu, K. Kato and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 47, No. 1, pp.592-595, 2008.
- [4] Ordering and Orientation of Epitaxial  $\text{CuInS}_2$  Films Grown on  $\text{GaP}(001)$  by Three-source Evaporation, R. M. Vequizo, S. Kobayashi, N. Tsuboi, K. Oishi and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 46, No. 2, pp.716-720, 2007.
- [5] Composition and Structure Control of  $\text{Cu-Al-O}$  Films Prepared by Reactive Sputtering and Annealing, N. Tsuboi, Y. Itoh, J. Ogata, S. Kobayashi, H. Shimizu, K. Kato and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 46, No. 1, pp.351-355, 2007.
- [6] Epitaxial Growth of  $\text{CuInS}_2$  Thin Films on  $(001)\text{GaP}$  by Three-source Evaporation, R.M. Vequizo, S. Kobayashi, N. Tsuboi, K. Oishi and F. Kaneko, *Phys. Stat. Sol. (c)*, Vol. 3, No.8, pp.2622-2625, 2006.

- [7] P-type Conductive CuYO<sub>2</sub> Phosphor Co-doped with Eu, Tb or Tm Rare-Earth Cation and Ca Acceptor Cation, N. Tsuboi, T. Hoshino, T. Suzuki, S. Kobayashi, K. Kato and F. Kaneko, *Phys. Stat. Sol. (a)*, Vol. 203, No.11, pp.2723-2728, 2006.
- [8] Organic light emitting diodes with nanostructured ultrathin layers at the interface between electron- and hole-transport layers, K. Kato, K. Takahashi, K. Suzuki, T. Sato, K. Shinbo, F. Kaneko, H. Shimizu, N. Tsuboi, T. Tadokoro and S. Ohta, *Current Applied Physics*, Vol. 5, pp.321-326, 2005.
- [9] Control of Luminescence and Conductivity of Delafossite-type CuYO<sub>2</sub> by Substitution of Rare Earth Cation (Eu, Tb) and/or Ca Cation for Y Cation, N. Tsuboi, T. Hoshino, H. Ohara, T. Suzuki, S. Kobayashi, K. Kato and F. Kaneko, *J. Phys. & Chem. Solids*, No.11, pp.2134-2138, 2005.
- [10] Effects of Annealing on Chemical Composition, Crystallinity, Optical Transmission and Electrical Conductivity of ZnO Thin Films Prepared on Glass Substrates by Chemical Bath Deposition, S. Kobayashi, K. Oshima, T. Sasaki, N. Tsuboi and F.Kaneko, *Japanese Journal of Applied Physics*, Vol. 44, No. 3, pp. 1372-1375. 2005.
- [11] Growth of CuInS<sub>2</sub> Epitaxial Films on Si(001) by Multisource Evaporation Method, S. Kobayashi, H. Kozakai, R. M. Vequizo, N. Tsuboi, K. Oishi and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 44, No. 2, pp. 999-1003, 2005.
- [12] Crystal Structure and Optical Properties of Defect-Chalcopyrite-Type MnGa<sub>2</sub>S<sub>4</sub>, N. Tsuboi, K. Ogihara, Y. Suda, K. Oishi, S. Kobayash and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 44, No. 1B, pp. 725-728, 2005.
- [13] Luminescence Properties of Delafossite-Type CuYO<sub>2</sub> Doped with Calcium, Oxygen or Rare Earth Tb, N. Tsuboi, H. Ohara, T. Hoshino, S. Kobayashi, K. and F. Kaneko, *Japanese Journal of Applied Physics*, Vol. 44, No. 1B, pp. 765-768, 2005