

Assoc. Prof. **Tomoyasu TANIYAMA**



Interdisciplinary Graduate School of Science and Engineering  
 Department of Materials Science and Engineering

Contact: Tel./Fax: 045-924-5632; [taniyama.t.aa@m.titech.ac.jp](mailto:taniyama.t.aa@m.titech.ac.jp)  
 Lab HP: <http://www.msl.titech.ac.jp/%7Eitohlab/>

Research field: Nanomagnetism and Spintronics

Research topics conducted within the G-COE project

**1. Optical spin pumping and spin detection in ferromagnet/semiconductor heterostructures**

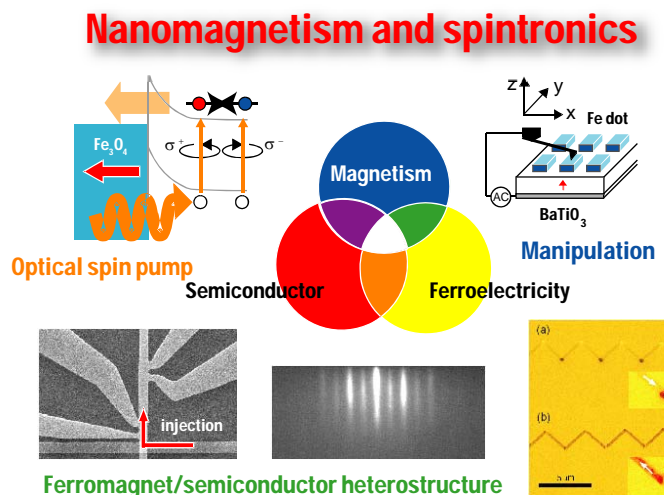
One of the key technologies in spintronics is to detect electron spins in semiconductors. For this purpose, we study spin filtering effect of spin polarized electrons at ferromagnet/semiconductor interfaces, thereby spin polarized electrons are excited using the optical selection rules.

**2. Detection of spin injection and relaxation processes using electroluminescence**

We study the mechanism of spin injection and relaxation processes analyzing the circular polarization of light emission from quantum wells and dots.

**3. Manipulation of magnetic dots in ferromagnet/ferroelectrics heterostructures**

Modification of magnetic domain structures at ferromagnetic dots/ferroelectrics interfaces is investigated using scanning probe microscopy.



Spintronics based on ferromagnet/semiconductor, ferroelectrics heterostructures

**Representative publications**

E. Wada, M. Itoh, and T. Taniyama, "Crossover of electron transmission mechanism and spin filtering effect at Fe/GaAs(001) interfaces" J. Appl. Phys. (2008).  
 K. Hamaya, M. Kitabatake, K. Shibata, M. Jung, M. Kawamura, K. Hirakawa, T. Machida, T. Taniyama S. Ishida, and Y. Arakawa, "Electric-field control of tunneling magnetoresistance effect in a Ni/InAs/Ni quantum-dot spin valve", Appl. Phys. Lett. **91**(2) (2007) 022107.  
 T. Taniyama, K. Akasaka, D. Fu, M. Itoh, H. Takashima, and B. Prijamboedi, "Electrical voltage manipulation of ferromagnetic microdomain structures in a ferromagnetic/ferroelectric hybridstructure", J. Appl. Phys. **101**(9) (2007) 09F512.  
 K. Hamaya, T. Taniyama, Y. Kitamoto, T. Fujii, and Y. Yamazaki, "Mixed magnetic phases in (Ga,Mn)As epilayers", Phys. Rev. Lett. **94**(14) (2005) 147203.  
 T. Taniyama, N. Fujiwara, Y. Kitamoto, and Y. Yamazaki, "Asymmetric transport due to spin injection into a Kondo alloy", Phys. Rev. Lett. **90**(1) (2003) 016601.