

Dr. Akira Toriumi
Professor
Department of Materials Engineering
School of Engineering
The University of Tokyo
Tokyo, Japan
7-3-1, Hongo, Tokyo 113-8656, Japan

Birth

Tokyo, Japan in August 3, 1953

Education

The University of Tokyo, Department of Applied Physics, Tokyo, Japan 1983: Dr. E, Applied Physics	1980 – 1983
The University of Tokyo, Department of Applied Physics, Tokyo, Japan 1980: M.E., Applied Physics	1978 – 1980
The University of Tokyo, Department of Physics, Tokyo, Japan 1978: B.S., Physics	1974 – 1978

Employment / research experience

- (1) The University of Tokyo, 7-3-1 Hongo, Tokyo 113-8656, Japan
Professor, Department of Materials Engineering 2000 – Present
- (2) National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan
Group leader of Advanced Gate Stack Technology, MIRAI Project 2001 – 2008
Research and development of high-k gate stack technology
- (3) Toshiba Corporation, 1, Komukai Toshiba-cho, Kawasaki, Japan 1983 – 2000
Research and management
Si-CMOS device physics, dielectric reliability and Si new devices,
- (4) Massachusetts Institute of Technology, Cambridge, MA, USA 1988 – 1990
Visiting scientist on leave from Toshiba
Physics of electron transport in quantum devices

Current research interests

◇ High-k Dielectrics

Research of new dielectric materials with high dielectric constant (high-k). Our group succeeded in the permittivity enhancement technology of thin HfO₂ film and found the dipole layer formation at the high-k and SiO₂ interface. Now we are interested in the design of dielectric film properties.

◇ Ge MOSFETs

Germanium CMOS is one of our current interests, since its mobility is much higher than silicon. But, intensive research is very rare, since the reliable gate dielectric film is difficult to form and Schottky barriers is hard to control. We have demonstrated metal source/drain n-ch Ge MOSFET operation for the first time.

◇ Functional metal oxides

Metal oxides show not only insulating properties but also various functional characteristics. We are now interested in the field-induced atom motion in oxides film both from application and materials science.

✧ Carbon-based Electronics

Science and technology of both organic TFTs and graphene are very attractive not only from application but also fundamental materials science. We are working on the development of high performance pentacene TFTs and on the characterization of graphene from the viewpoints of graphene/metal and graphene/insulator interfaces. .

Membership in professional organization

The Japan Society of Applied Physics (JSAP), Fellow
The Physical Society of Japan (JPS)
The Institute of Electrical & Electronics Engineers (IEEE)
American Physical Society (APS)
Material Research Society (MRS)
Electrochemical Society (ECS)

Honors and awards

IEEE EDS Paul Rappaport Award	2004
IEEE International Reliability Physics Symposium, Best Paper Award	1997
JSAP Solid-State Device and Materials, Best Paper Award	2000 & 2003

Publications and presentations

Over 250 publications in peer-reviewed journals, refereed conference proceedings.
A number of short course lectures in international conferences such as IEDM, VLSI Symposium, SSDM.

Conference organizer/ program committee

Executive Committee	
VLSI Symposium	2008-present
Executive Committee	
The Japan Society of Applied Physics	2004-2006
Program Chair	
International Solid State devices and Materials	2005
International Workshop of Dielectric Thin Films	2006
General Chair	
Si-Nanoelectronics Workshop (IEEE/JSAP)	1999
Conference Program Committee Member (past)	
IEEE-IEDM, DRC, SISC, MRS, ECS	
AVS-PCSI (present)	
Many topical conferences and workshops in Japan	
Associate editor of technical journals	
IEEE Transaction of Nanotechnology (Past)	
Science and Technology of Advanced Materials (Past)	