Greater Impacts of Nanotechnology and Quantum

Professor/Dean Chao-Sung Lai

E-mail : cslai@mail.cgu.edu.tw

Department of Electronics Engineering, Chang Gung University, Taiwan
Department of Nephrology, Chang Gung Memorial Hospital, Taiwan

Abstract:

Fundamental contributions of nanotechnology include but not limited to: (1) Miniaturization, (2) Energy-efficiency, (3) Higher efficiency and/or effectiveness. Exploration of new computing paradigms such as bio-inspired computation and quantum computing belongs to the latter. Continuous advances in semiconductor technology include "more Moore" which following Moore's Law scaling and "more than Moore" by hybrid integration with new materials. A lot of success appears in functionality and scaling in the fields of electronics, optics, sensors and biomedical applications.

In this talk, we will present how to further combine graphene and new 2D materials, extending into the quantum realm, with the cutting-edge of modern scientific and engineering research. The impacts of nanotechnology and quantum include (1) materials to devices: graphene and two-dimensional materials, insulators, nano transistor fabrication, (2) module demonstration: electronics and optics logic-operation, true random number generator (TRNG) and photovoltaic cells, (3) quantum era: quantum device design and quantum memory ideas as well as quantum computing.

In addition, a hybrid-transistor-based artificial reflex arc (ARA) and artificial pain modulation system (APMS) will be addressed that illustrates future intelligent alarm systems, neuroprosthetics, and neurorobotics. Sharing of materials by various research laboratories is highly acknowledged.