



Investigation of charge dynamics in a quantum capacitor by using STM with nano-second time resolution

Prof. In-Whan Lyo, Dept of Physics, Yonsei University, Seoul, South Korea

Quanta such as electrons play a fundamental role in energy transduction (ET) at nano-scale. Artificial manipulation of the flow of energy down to the individual quantum into a specific site with sub-angstrom precision could lead to a wide variety of new technological capabilities. We investigated the creation of the bisolitons on Si(001) surfaces, the simplest topological excited states in the buckled order of Si dimers, by using STM with the unusual combination of nano-second and sub-angstrom resolutions, and the controllability of unit charge flow. It is found that the production of bisolitons at its threshold is achieved not through the decay of individually deposited holes, but via a novel ET process of field switching: Sudden switching of a local field induces a transient empty quantum well at surface that acts as a tunable energy source for the bisoliton creation. Our results illustrate the importance of understanding the ET process at nano-scale.