

Motivation

For future nano- and quantum-electronics, we are developing technology that enables us to fabricate atom transistors, which operate with a power of a dopant, or a single impurity atom in silicon.

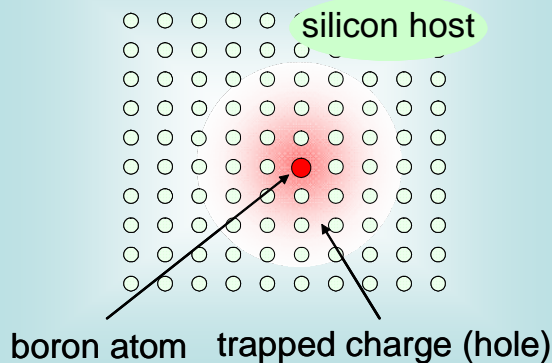
Originality

We fabricated transistors that contain only one dopant (boron atom) and found that the transistor characteristics changed according to the position of the dopant in the transistor channel.

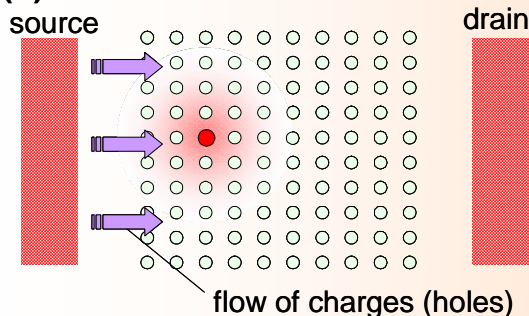
Impact

The present results are significant advance towards realization of making atomic-scale transistors. The integrated circuits composed of such atom transistors would be ultimately small, low power, and highly functional as they can enjoy various atomic properties of the dopant.

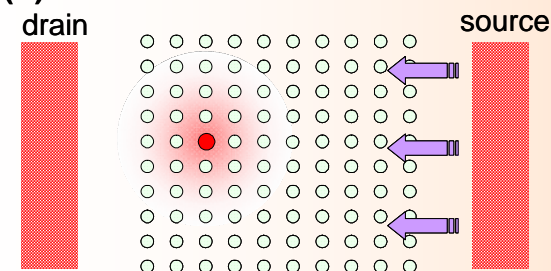
Single dopant in silicon



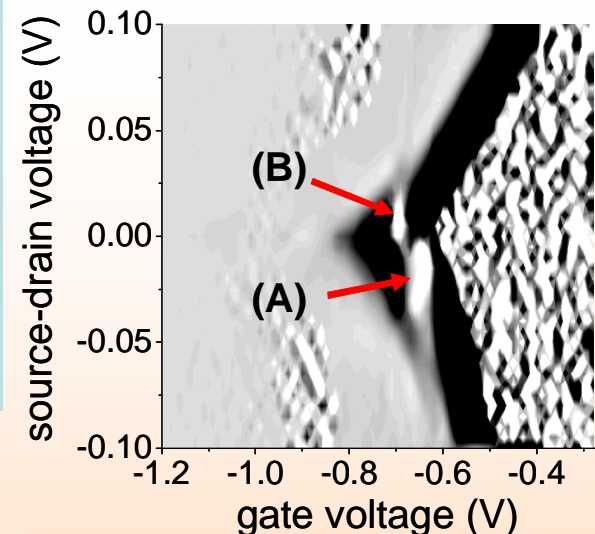
(A) Boron atom at the source



(B) Boron atom at the drain



Experiments



(A) large shift (B) small shift

