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Wolkow et al.

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(54) **MULTIPLE SILICON ATOM QUANTUM DOT AND DEVICES INCLUSIVE THEREOF**

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(57) **ABSTRACT**

A multiple-atom silicon quantum dot is provided that includes multiple dangling bonds on an otherwise H-terminated silicon surface, each dangling bonds having one of three ionization states of +1, 0 or −1 and corresponding respectively to 0, 1, or 2 electrons in a dangling bond state. The dangling bonds together in close proximity and having the dangling bond states energetically in the silicon band gap with selective control of the ionization state of one of the dangling bonds. A new class of electronics elements is provided through the inclusion of at least one input and at least one output to the multiple dangling bonds. Selective modification or creation of a dangling bond is also detailed.

26 Claims, 35 Drawing Sheets