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Molecular Transistor

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Inventors

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Invention Description

Many efforts have been made to control the speed with which molecules pass through a small orifice. This could be useful for new approaches to DNA sequencing, new sensors, and digital computing based on hybrid electronic/molecular transistors. Current designs, however, are complex and have important limitations, such as limited ability to control molecular flow through the device. Thus, a need exists for a microfluidic device that precisely controls the flow of individual molecules through a channel under direct electronic control.

Researchers at the Biodesign Institute of Arizona State University have developed a novel molecular transistor able to precisely control the flow of individual molecules through a channel, and even detect the passage of individual molecules or individual chemical reactions. This is done under direct electronic control and thus permits this device to be coupled to an electronic circuit or computer.

Because the gate electrode is chemically and electrically isolated from the molecular channel, it has maximum versatility with many types of molecules and chemical reactions. This opens the door to many new devices and techniques in chemical synthesis, sensors, digital computing, and single molecule reactions.

Potential Applications

- Massively parallel devices for chemical synthesis under direct computer control
- Single molecule sensors
- Hybrid electronic/chemical digital computing
  - DNA computing
- Sensors for single chemical reactions
  - DNA sequencing

Benefits and Advantages

- Makes no preconditions about the molecular species used/detected
- Precise electronic control of the molecules passing through the channel, down to single molecules
- Able to detect single molecules and single chemical reactions

Intellectual Property Status:
Patent Pending

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