

Why Do We Need Molecular Transistors?

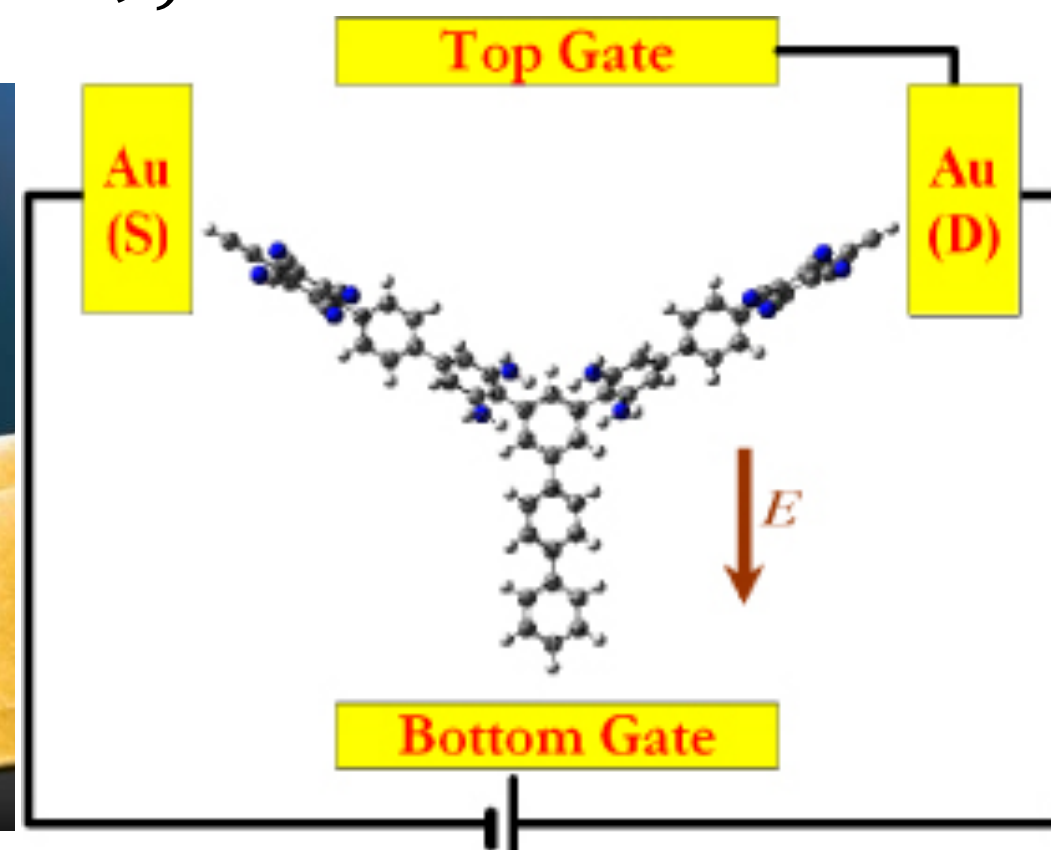
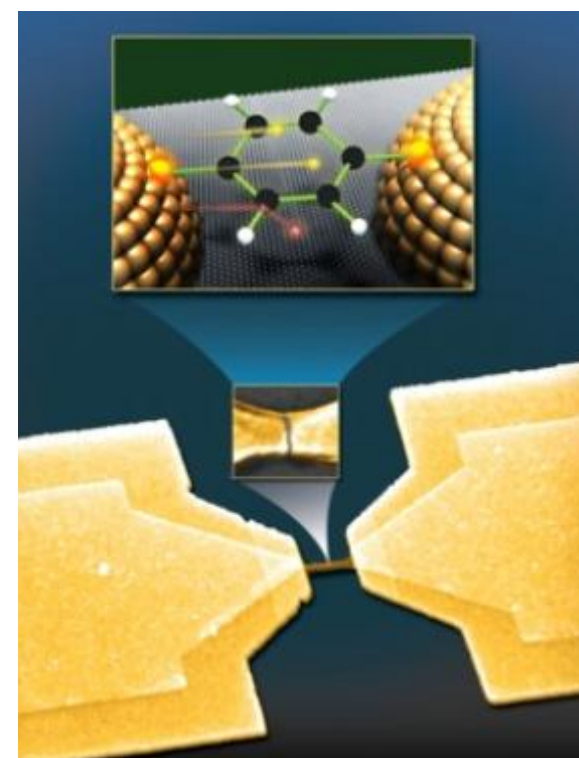
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Definition of Problem: Smaller transistors mean better performance and more power. However, quantum tunneling occurs in atomic scales. Another problem with today's transistors is that they generate heat. A number of molecular transistor models have been created to overcome these problems. One of these models will be discussed.

Molecular Transistors

First functional molecular transistor created:

- Researchers at Yale and Gwangju University. (2009)



Molecular Transistor

A Schematic Representation of a Molecular Transistor (S: Source, D: Drain)

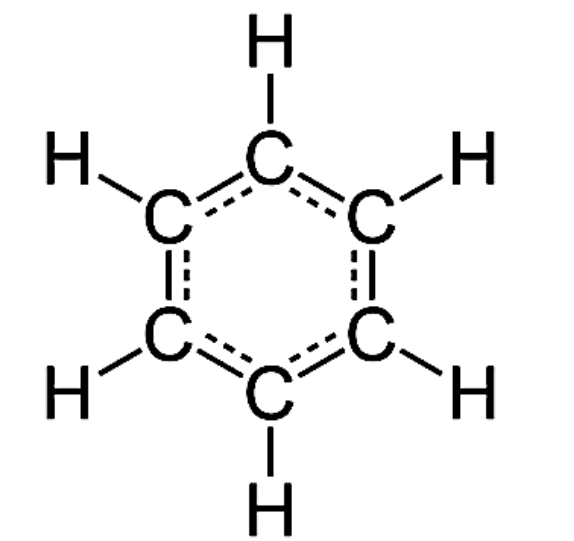
- Made up of gold contacts and benzene molecules.
- Different energy states of the molecule are manipulated by changing the voltage applied to it.

Characteristic of Benzene

Resonance structure.

↳ Wave property of electrons.

↳ Less heat generation.



Structure of Benzene

Advantages of Molecular Transistors

Energy consumption is reduced.

Less heat generation

Advantages

Works at room temperature.

Processing speed is increased.

Conclusion

If studies on molecular transistors succeed:

- We will be able to benefit from quantum properties.
- The technology we use today will make progress with better performance and more power.
- It will enable the development of nanotechnology.
- The life of electronic devices will increase.

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