



# Ion Gel Gate Insulator in Field Effect Transistors

Technology ID

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## Category

Engineering & Physical Sciences/Materials

Engineering & Physical Sciences/Semiconductor

## Ion Gel Gate Material for Field Effect Transistors and Printed Electronics

Ion gel can replace solid polymers as an insulator of logic gates in field effect transistors. Solid polymers are transparent but have issues with degradation and conductivity. This problem was solved by using a polymer finely blended with an ionic liquid to create an ion gel. This ion gel gate material has dramatic improvements in conductivity which allows for potentially faster processing speeds, lower voltages, higher currents, and higher durability. The gate insulator material can also be deposited at room temperature directly onto plastic which opens up the number of possible applications. The ion gel gate material for use in field effect transistors is an easily applied and cost effective substance for use in low voltage electronics such as printed electronics. It provides higher current than conventional silicon thin film transistors which opens up possibilities in organic light emitting diodes and electronic signs.

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## Applications Include Radio Frequency Identification (RFID), Electronic Signs, Electronic Displays, and Memory

Organic gate dielectrics such as the ion gel material are great options for low-cost, flexible substrate electronic applications such as printed electronics. The specific applications include radio frequency identification used in tracking products, animals, or people for the purpose of identification. The gate dielectrics may also be efficiently used in electronic signs, electronic displays, and various memory applications such as solid state memory.

## FEATURES AND BENEFITS OF THE ION GEL GATE MATERIAL FOR USE IN PRINTED ELECTRONICS:

- Operates at a low voltage, therefore allows significant power savings over solid polymer transistors
- Faster processing speeds because the high conductivity of the material allows for faster switching speeds over solid polymer transistors
- Ion gel can be deposited at room temperature making it amenable to printing onto plastic
- Higher current than conventional silicon thin film transistors opens up possibilities in organic light emitting diodes and electronic signs

**Researchers:** C. Daniel Frisbie Professor, Chemical Engineering and Materials Science, College of Science and Engineering