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Yield Enhancement on Memory Device Fabrication Using Solubility-Controlled Polymer Solution

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Since graphene has excellent electrical properties and flexible mechanical properties, much research has been done as a key material for flexible electronic devices. To fabricate a large-area graphene electronic device, graphene usually synthesized on a copper foil is used. However, the copper foil and high temperature processing consumed to synthesize graphene is becoming a major cause of reduced graphene efficacy by raising the price of graphene. Therefore, there is a demand for a method to fabricate an electronic device while reducing graphene consumption. In this study, we will demonstrate a method for fabricating electronic devices that minimize the amount of graphene used. That is transferring graphene to a desired location by using a graphene-ferroelectric hybrid film. The ferroelectric polymer is utilized as a main material of a memory device. When the hybrid film is transferred twice, it can be utilized as a memory transistor, and when it is transferred three times, it can be used as a logic gate such as AND or OR gate.

However, when the hybrid film is transferred many times, there is a problem that graphenes between layers are connected. For example, in the case of a transistor, a gate electrode and a channel are connected to each other. In this study, the possibility of electrical connection between graphenes was blocked by using solubility-controlled solution. As a result, it was possible to fabricate a graphene device which normally operates as a memory device and a logic device.

Biography:

Ms. S. H. Ko is an undergraduate student at Jeju National University in Korea, and her research interests are semiconductor memory devices. Mr. S. A. Rahman and Mr. S. A. Khan are graduate students in master course. Prof. Dr. W. Y. Kim is an assistant professor at Jeju National University in Korea since 2017. His research fields include applications of ferroelectric polymer and graphene process.