

# **Polypyrrole and AuNPs Hybrid DNA-Templated Nanowires**

**Daeyoung Bang, Kyoungseob Kim and Yonghan Roh**

School of Information and Communication Engineering, Sungkyunkwan University  
Suwon, Republic of Korea

## **Abstract**

Nanosized structure has been widely used for biosensor because of manufacturing portable biosensor equipment. Representatively, DNA molecules and gold nanoparticles(AuNPs) are widely used for biosensor. DNA has a property of self-assembly with a width of 2 nm, which is a good nanowire itself, and DNA has phosphate backbone having negative charge. Using these properties of DNA molecular. many research groups have studied the formation of nanowires using DNA as a template with two methods. First method is attaching positively charged nanoparticles on phosphate backbone of DNA. Another method is polymerization and metalization of DNA molecules. In this work, we formed DNA-templated AuNPs and were attached on the phosphate backbone of DNA molecules. However, continuous nanowire could not be formed using attachment of AuNPs on DNA molecules. To form the continuous conductivity nanowire, empty spaces among AuNPs were polymerized with polypyrrole which is one of the conducting polymer. Polypyrrole were attached on empty space of AuNPs-DNA strands. We measured the nanowire structure by AFM and I-V characteristics by conducting probe AFM mode. We could confirm continuous nanowire was formed by these results. These AuNPs and polypyrrole hybrid nanowire could be used for biosensor via attaching biomolecule to AuNPs.