

# Design of Multi-Functional Conjugated Polymers for Biomedical

## Applications

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Water-soluble conjugated polymers (CPs) provide a unique platform for chemical and biological sensors in view of their optical signal amplification effect. Our recent studies showed that CPs/DNA complexes combining with fluorescence resonance energy transfer (FRET) processes could be used for detecting disease-related gene modifications, such as single nucleotide polymorphisms (SNPs), mutations and DNA methylation. In recent years, the drugs integrating recognition, imaging and therapeutic functions have attracted more and more attention. They are expected to become a new strategy for the treatment of major diseases. We developed a new technique for preparing multicolor microparticles based on the self-assembly of bacteria and conjugated polymer nanoparticles (CPNs). They can be successfully applied for cell imaging and optical barcoding. A polythiophene-porphyrin dyad was prepared for effectively killing neighboring cells. This multifunctional material that simultaneously provides therapeutic action and image the results provide new strategies for the treatment of various diseases. A cationic poly(p-phenylene vinylene) derivate bearing polyethylene glycol (PEG) side chains was also synthesized and used for selective recognition, imaging and killing of bacteria over mammalian cells. This material exerts a far-reaching impact on the future development of antimicrobial materials. These results exhibit that the multi-functional conjugated polymers are ideal platforms for recognition, imaging and disease therapy.

### References

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