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ABSTRACT BOOK

Label-free optical DNA detection using a bio-hybrid poly (3-methylthiophene) single nanowire

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We reported on the DNA sensing using a light-emitting poly (3-methylthiophene) (P3MT) single nanowire (NW). The probe DNAs (*p*-DNAs) were easily attached to the P3MT NWs through electrostatic interaction between the negative counter-ions and the terminal amine (NH₃⁺) group attached at the end of the *p*-DNA. After the functionalization *p*-DNA and their label-free recognition of target DNAs (*t*-DNAs) onto the surface of P3MT NWs, the light-emitting color and intensity of a P3MT single NW were dramatically changed due to the conformational changes of the P3MT main chains and fluorescence resonance energy transfer. We observed color change of a P3MT single NW from green to red after attaching the *p*-DNA, and then luminescence intensity of a single P3MT/*p*-DNA NW was dramatically enhanced by hybridizing *t*-DNA. The conformational changes of the P3MT main chains due to attaching *p*-DNA were investigated ultraviolet-visible absorption and confocal Raman spectra. The enhanced PL of the P3MT/*p*-DNA+*t*-DNA can be explained in terms of the dopant-mediated fluorescence resonance energy transfer effect.