

Highly sensitive and label-free colorimetric detection of nucleic acids based on photo-induced silver ion reduction on DNA

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A label-free and highly sensitive colorimetric method was developed for nucleic acids detection based on photo-induced silver ion (Ag^+) reduction on DNA. The intrinsic property of DNA which absorbs specific wavelength of UV light was utilized to reduce Ag^+ which is bound to DNA through an interaction with nucleobases. The DNA- Ag^+ complex was exposed to 254 nm UV light to induce reduction of Ag^+ because DNA strongly absorbs the UV light and it causes oxidation of the DNA bases which consequently promotes silver nucleation and deposition on the DNA. Through this process, silver nanoparticles (AgNPs) are generated and they give a visually detectable color change of the DNA solution by exhibiting an absorption peak at around 420 nm. It enabled a direct colorimetric detection of bacterial genomic DNA without any target or signal amplification. The clinical applicability of this simple but very efficient strategy was successfully demonstrated by detecting unamplified genomic DNA of *Salmonella typhimurium* pathogen with an ultrahigh sensitivity.