Interaction of gas-born Ag nanoparticles with DNAs of salmon testes

M. Shibata, N. Nishida, H. Tanaka

Institute of Science and Engineering, Chuo Univ. 1-13-27 Kasuga, Bunkyo-ku, Tokyo, 112-8551, Japan
Keywords: Ag nanoparticle, gas born, DNA, salmon testes
Presenting author email: tef.ts2525@gmail.com

Ag nanoparticles are widely used nowadays in the daily products because they are believed as safe and functional, but their actual affection for biomaterials such as DNAs has not been well known yet. In this study, we have investigated interaction of gas-born Ag nanoparticles with DNAs of salmon testes by using gas-liquid transport method recently developed [1].

Ag nanoparticles were produced by gas aggregation method heated at 1100 ^{o}C with N_2 gas flow at 2.0 slm, and were directly blowing into DNA dispersion for 24 h; the DNA dispersion was prepared by mixing of 1.0 mg of salmon testes DNA with 200 mL of pure water. The obtained dispersion was analyzed using scanning transmission electron microscope (BF-STEM), absorption spectrum, circular dichroism (CD) spectroscopy and fluorescence spectroscopy. Diameter of the produced nanoparticles was estimated to be 8 nm at this condition from STEM images for specimen collected by electro-deposition of nanoparticles onto collodion-coated Cu grid.

Figure 1 shows that absorption spectrum of salmon-testes DNA dispersion after blowing of 8 nm Ag nanoparticles for 24 h. The peak at 260 and 410 nm are ascribed to DNA and Ag nanoparticles. Appearance of the 410 nm peak indicates that Ag nanoparticles were effectively taken into dispersion. In fact, when the dispersion was observed by STEM images, extensive amount of nanoparticles was observed. In addition, diameter and shape of these nanoparticles were the almost same as those for the gas-born Ag nanoparticles themselves. It is worthy to note that the observed absorbance was much higher than that reported previously [1]. This indicates that DNAs were highly probable to be worked as effective collector of gas-born nanoparticles.

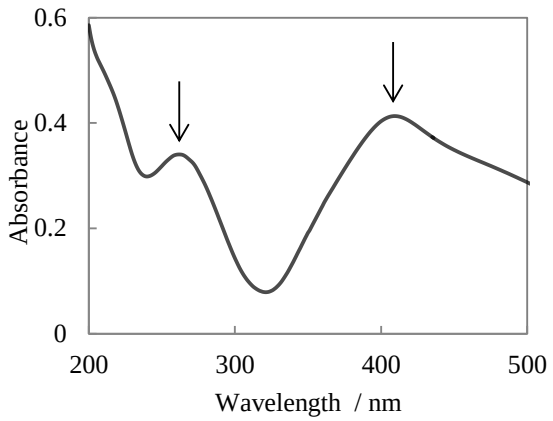

Figure 1. Absorption spectrum of dispersion of salmon-testes DNAs after blowing of gas-born Ag nanoparticles with 8 nm in diameter for 24 h.

In CD spectrum, peak profiles due to Cotton effects for B-form DNA were found to be completely changed for the dispersion after blowing. This indicates that introduction of Ag nanoparticles into dispersion causes conformational change of DNAs. Additionally, when ethidium bromide known as intercalater of double strand of DNA was used as chromophor, distinct decrease of fluorescence was observed for the dispersion after blowing. This indicates that DNA structure was effectively affected by Ag nanoparticles.

[1] N. Hashimoto, N. Nishida, H. Murayama, and H. Tanaka, (2011) Chem. Lett. 40, 144-146.