Tatsuki Kunoh et al., J Biotechnol Biomater 2017, 7:5 (Suppl)
DOI: 10.4172/2155-952X-C1-083

Green synthesis of gold nanoparticles coupled with nucleic acid oxidation

Tatsuki Kunoh[1], Minoru Takeda[2], Syuji Matsumoto[1], Ichiro Suzuki[2], Mikio Takano[1], Hitoshi Kunoh[1] and Jun Takada[1]
[1]Okayama University, Japan
[2]Yokohama National University, Japan

So-called green synthesis of safe metal nanoparticles, especially gold nanoparticles (AuNPs), has increased in importance for medical and pharmaceutical applications. Thus, a variety of ecofriendly, energy- and cost-saving techniques have been developed. Here, we show that RNA prepared from Leptothrix (iron-oxidizing bacteria) cells can reduce Au(III) and spherical AuNPs eventually form when an aqueous solution of Au chloride ($HAuCl_4$ solution) is added under ambient conditions. RNA and DNA of other organismal origins have the same ability. Of the nucleosides and nucleobases, only guanosine and guanine can form AuNPs. The DNA moiety, 2'-deoxyguanosine (dG), used as a reference material, forms AuNPs when mixed with $HAuCl_4$ solution, but 8-hydroxy-2'-deoxyguanosine (8-OHdG) does not, indicating that AuNP-formation evidently depends on the reduction potential of the guanine moiety, not the sugar moiety. This finding is the first demonstration that spherical AuNPs of ca. 5 nm diameter can be obtained by simply adding guanine to $HAuCl_4$ solution at ambient temperature and no other chemicals or physical treatments are needed.

Biography

Tatsuki Kunoh is presently an Associate Professor of Graduate School of Natural Science and Technology, Okayama University, Japan. He received his BSc in Biotechnology, MSc and PhD degrees in yeast cell biology at Osaka University. He accumulated his experiences in Molecular Biology and Biochemistry in Albert Einstein College of Medicine, USA and other Universities, Japan. Currently, he is a member of the Government-granted project-Toward creating innovative applications to harness the novel functions of nano-scaled iron oxides of microbial origin in CREST supported by JST and his research focuses on the biomaterial science.

tkunoh06@cc.okayama-u.ac.jp