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Abstract
The study were divided into two parts. Firstly, use plasmid as a template for gold nanoparticles self-assembly in order to prepare nanometer size lines. Secondly, apply the near infrared laser to complex nanoparticles, Fe3O4@SiO2@Au, to test its heating capacity. For the preparation of nanometer line, use the Fe3O4@SiO2 complex nanoparticles ,prepared by chemical co-precipitation and sol-gel methods, to purify the plasmid. And then, use plasmid as a template under [AOT/Isooctane]=0.1M, reaction temperature 0℃ and reaction time 10mins to assemble gold nanoparticles. In order to prepare appropriate nanometer lines, the rate of reduction reaction of gold nanoparticles, plasmid amount added and HAuCl4 concentration were necessary to investigate. The result indicate that the appropriate condition was [NaBH4]/ [HAuCl4]=5, [HAuCl4]=10mM, [NaBH4]=50mM and plasmid amount 0.5μg and the obvious plasmid cycle comformation shown. In addition, use three different length segments as templates, by EcoRI and HindIII to cut the plasmid, for assembling gold nanoparticles. Three different length 0.8μm, 0.4μm and 0.2μm lines, could be formed by gold nanoparticles.

In order to test the heating capacity of Fe3O4@SiO2@Au, apply the near infrared laser with wave length812.3nm to this complex nanoparticles. The result indicate that the surface gold amount on SiO2 nanopartilces was increased with coating frequency under the condition,[SiO2]=0.5g/mL, [HAuCl4]=5mM and [NaBH4]=50mM. characterized by UV/VIS. For heating capacity of complex nanoparticles, the rising temperature 10.4℃、15.7℃ and 18.4℃ could be shown for first, second and third times coating using gold nanoparticles, respectively. The SAR values were 186W/g(about 0.09J/s),293.5W/g(about 0.15J/s), 356.46W/g(about 0.19J/s). It could be suggested that the heating capacity of complex nanoparticles was due to surface plasmon resonance.
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