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## Thermosensitive polymer-modified gold nanoparticles with sensitive fluorescent properties

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**Abstract:** Two types of thermosensitive polymer-modified gold nanoparticles (GNPs), P(DMAM-co-MADMAC)-modified GNPs (GNPs@PDM) and P(NIPAM-co-MADMAC)-modified GNPs (GNPs@PNM), are fabricated by the “grafting through” polymerization technique. The as-prepared GNPs are characterized by UV-Vis, TEM, XPS, TGA, FT-IR and <sup>1</sup>H NMR spectroscopy. The thermosensitivity and fluorescence of the GNPs are investigated. It is found that all GNPs aqueous solutions but GNPs@PDM1 exhibit thermosensitivity originated from thermosensitive polymer chains and sensitive fluorescence from the dimethylaminochalcone group. The low critical solution temperature (LCST) of the GNPs decreases with the increasing content of MADMAC unit in the GNPs. The GNPs aqueous solution shows weak fluorescence after the temperature increases from 25 °C to 45 °C, or after β-cyclodextrin (β-CD) is added. Furthermore, it exhibits strong fluorescence when the solvent is changed to ethanol or chloroform, and the fluorescent wavelength undergoes a blue shift from ethanol to chloroform.

**Keywords:** gold nanoparticles; thermosensitive polymers; sensitive fluorescence

### Introduction

In the past decades, many researchers are attracted by the functionalized gold nanoparticles (GNPs) and nanoclusters (GNCs) due to their discrete energy levels and a multitude of molecular-like properties, which have been widely exploited for applications in the fields of optoelectrical device, catalysing, biological sensing,

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