

# Method For Preparation Of Micellar Hybrid Nanoparticles For Combined Therapeutic And Diagnostic Medical Applications

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## BACKGROUND

Multifunctional nanoparticles have the potential to deliver both therapeutics and diagnostics to tissues simultaneously using a single nanodevice. To date, several types of hybrid nanosystems have been developed and used *in vitro* for magnetic cell separation and targeting. However, the *in vivo* utility of these nanocomposites may be limited due to poor stability or short systemic circulation times. Furthermore, existing technologies do not adequately allow for co-delivery of a therapeutic and an agent enabling advanced diagnostic imaging.

## TECHNOLOGY DESCRIPTION

This invention provides both the composition and a novel method for creating micellar hybrid nanoparticles that exhibit substantial *in vivo* circulation times, allowing them to contain a diverse payload for periods of time sufficient for delivery and subsequent release to a desired tissue. In addition, this technology readily facilitates the simultaneous targeted delivery of both therapeutic and imaging agents to diseased tissue *in vitro* or *in vivo*.

## ADVANTAGES

- ▶ *In-vivo* stability allows for prolonged integrity in systemic circulation.
- ▶ Micellar structure allows delivery of a broad array of payloads, including, magnetic particles, quantum dots, or a therapeutic agent.
- ▶ Reduced cytotoxicity of both hydrophobic drugs and nanoparticle itself.
- ▶ Enables co-delivery of therapeutic agents and diagnostic agents that enable imaging.

## APPLICATIONS

- ▶ Medical imaging
- ▶ Cancer diagnostics and therapeutics
- ▶ Diagnostic and therapeutics for various diseases
- ▶ Vaccines

## STATE OF DEVELOPMENT

This technology is offered exclusively or nonexclusively for U.S. and/or worldwide territories. A commercial sponsor for potential future research is sought.

This technology has been used *in vitro* and *in vivo* to deliver an anti-cancer agent and two types of nanoparticles that aid in fluorescence and magnetic resonance imaging to diseased tissue (see reference below).

## RELATED MATERIALS

- ▶ Park JH, von Maltzahn G, Ruoslahti E, Bhatia SN, Sailor MJ (2008). Micellar hybrid nanoparticles for simultaneous magnetofluorescent imaging and drug delivery. *Angew Chem Int Ed Engl.* 47(38):7284-8. - 08/11/2008

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## OTHER INFORMATION

### KEYWORDS

drug delivery, biological imaging,  
  
cancer, diagnostics, nanotechnology,  
  
nanoparticles, micelle

### CATEGORIZED AS

- ▶ **Medical**
  - ▶ Delivery Systems
  - ▶ Diagnostics
  - ▶ Disease: Cancer
- ▶ **Nanotechnology**
  - ▶ NanoBio

### RELATED CASES

2008-313-0

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