Joint Event on
30th Annual Congress on
Nanotechnology and Nanomaterials
&
8th World Congress on
Spectroscopy and Analytical Techniques
September 10 - 11, 2018 I Stockholm, Sweden

Coating carbon nanosphere with patchy gold for production of highly efficient photothermal agent

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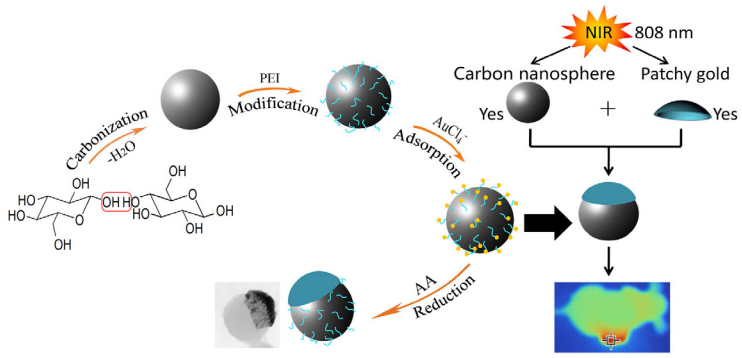
In this work, we design and construct a novel photothermal therapy (PTT) agent by coating a carbon nanosphere with patchy gold. To synthesize this composite particle with Janus structure, a new versatile approach based on a facile adsorption–reduction method was presented. Different from the conventional fabrication procedures, the formation of patchy gold in this approach is mainly a thermodynamics-driven spontaneous process. The results show that when compared with the conventional PTT agent gold nanorod the obtained nanocomposites not only have higher photothermal conversion efficiency but also perform more thermally stable. Based on these outstanding photothermal effects, the in vitro and in vivo photothermal performances in an MCF-7 cell (human breast adenocarcinoma cell line) and mice were investigated separately. Additionally, to further illustrate the advantage of this asymmetric structure, their potential was explored by selective surface functionalization, taking advantage of the affinity of both patchy gold and carbon domain to different functional molecules. These results suggest that this new hybrid nanomaterial can be used as an effective PTT agent for cancer treatment in the future.



Biography

Xiaoxiao Wang received her BS degree in Applied Chemistry from Huangshan University in 2013. She is now pursuing her PhD degree in the School of Chemistry and Chemical Engineering, Southeast University, China. Her current research interests include the synthesis, characterization and applications of photothermal therapy materials.

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