

Quantum beam–applied liquid metal nanoparticularization for cancer optotheranostics

December 21 2021

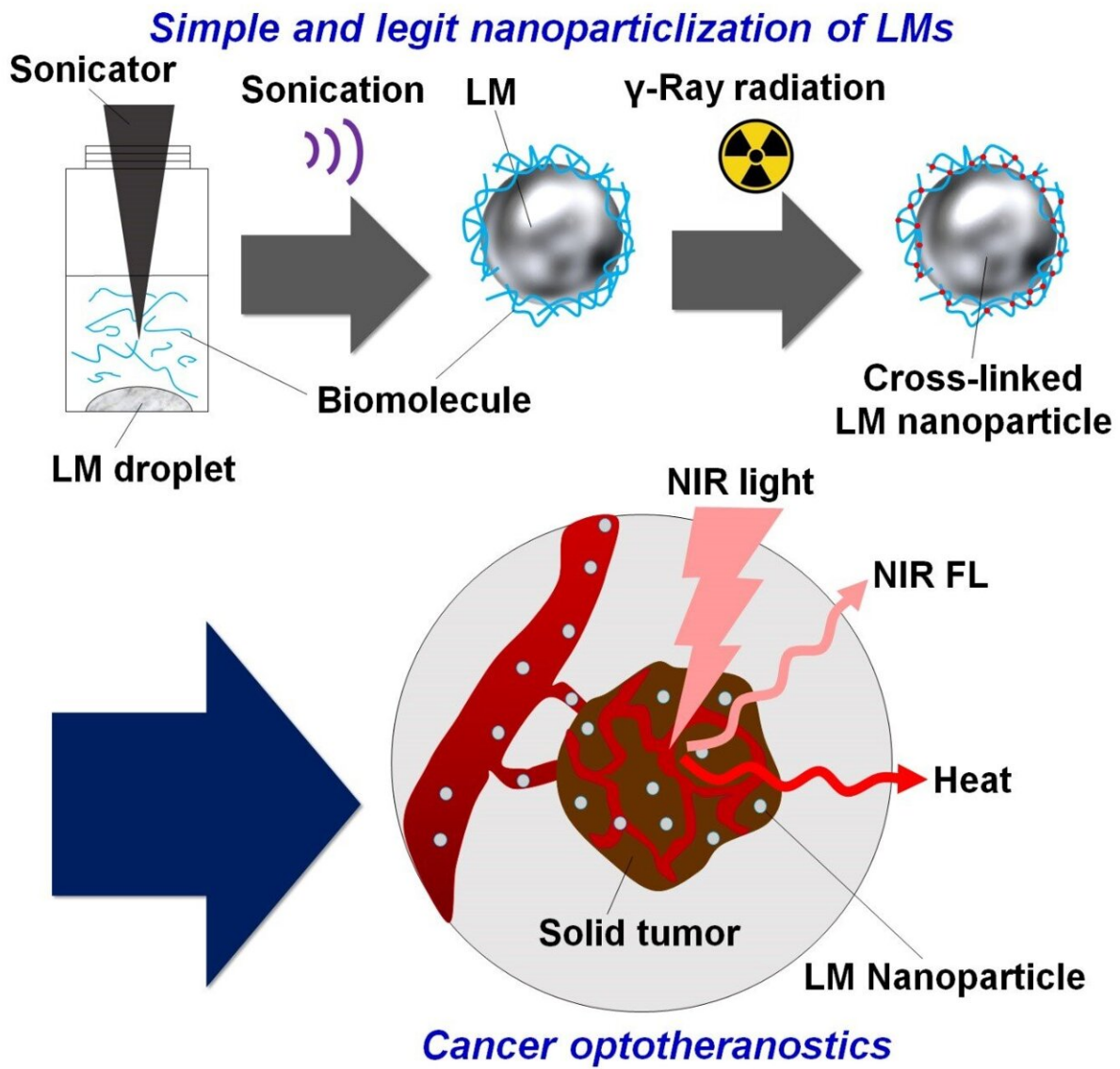


Figure 1. Schematic illustration of cancer optotheranostics using functional liquid metal nanoparticles. LM: liquid metal, NIR: near-infrared, FL: fluorescence. Credit: Japan Advanced Institute of Science and Technology

Due to their unique characteristics, gallium-based liquid metal (LM) nanoparticles have been applied in various research fields. LM nanoparticle surface-modification design is essential for enhancing the original LM properties and physicochemical multifunctionalization.

Besides, standard [cancer](#) treatments are currently limited to surgery, radiation, and chemotherapy. Unfortunately, all three methods risk damage to normal tissues or incomplete eradication of the cancer. Development of LM-based nanomedicinal technology is challenging area for exploring new and innovative applications in the advanced cancer treatments.

Scientists at Japan Advanced Institute of Science and Technology (JAIST) and National Institutes for Quantum Science and Technology (QST) have created a cancer optotheranostics using functional eutectic gallium-indium (EGaIn)-based LM nanoparticles that were successfully synthesized by various biomolecules (gelatin, DNA, lecithin, and [bovine serum albumin](#)), sonication, and quantum beam (γ -ray) radiation (Figure 1).

Developed by Associate Professor Eijiro Miyako and his team from JAIST, a sonication- and γ -ray-mediated nanoparticlization method using various biomolecules and EGaIn can be effectively worked as a platform for cancer optotheranostics. In fact, the synthesized biomolecule-functionalized LM nanoparticles exhibited unique structural and excellent physicochemical traits for NIR bioimaging systems to

identify tumor location in mice. Additionally, they succeeded the spatiotemporal photothermal activation of LM nanoparticles for elimination of colon tumors. The team believes that the research provided a new design and functionalization of LM [nanoparticles](#) and opened new opportunities to advance optotheranostics in cancer treatment.

More information: Qi Yun et al, Sonication - and γ -ray-mediated biomolecule-liquid metal nanoparticlization in cancer optotheranostics, *Applied Materials Today* (2021). [DOI: 10.1016/j.apmt.2021.101302](https://doi.org/10.1016/j.apmt.2021.101302)

Provided by Japan Advanced Institute of Science and Technology

Citation: Quantum beam–applied liquid metal nanoparticlization for cancer optotheranostics (2021, December 21) retrieved 25 June 2024 from <https://phys.org/news/2021-12-quantum-beamapplied-liquid-metal-nanoparticlization.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--