

## Conference Abstracts

# Targeted Gold-Coated Thermo-Responsive Liposomes Enabling Multimodal Imaging and Photothermal Tumor Ablation

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## Background

Targeted nanocarriers hold significant promise for improving cancer therapy by enhancing delivery efficiency and reducing off-target effects. Integrin-binding peptides such as RGD offer a strategy for selective tumor targeting. This work aims to develop a multifunctional nanoparticle platform integrating lipid-based carriers with a metallic coating and a targeting ligand for improved cancer-specific interaction.

## Methods

A lipid-based nanosystem was fabricated and subsequently modified using a controlled surface-coating approach. A tumor-targeting peptide was conjugated using standard activation chemistry. The resulting nanostructures were evaluated using electron microscopy and elemental/spectroscopic techniques to assess morphology, composition, and successful surface modification.

## Results

TEM and HR-TEM confirmed spherical nanostructures (150–200 nm) with a clear gold nanoshell and crystalline gold lattice fringes.

EDX and elemental mapping demonstrated distinct Au signals localized on the vesicle periphery, confirming surface gold deposition. XPS of gold-coated liposomes showed strong Au 4f peaks and lipid-associated C 1s signals, while cRGD-tagged samples displayed additional N 1s and P 2p peaks, confirming successful peptide and phospholipid conjugation. ICP-OES further verified gold loading in coated samples and the presence of P and S consistent with lipid and peptide components. Together, the data validate stepwise assembly of liposome, gold shell, PEG linker peptide, with preserved vesicle stability.

## Conclusion

Gold-coated, cRGD-functionalized liposomes were successfully synthesized and structurally verified using multiple analytical techniques. The platform demonstrates stable core-shell morphology, efficient gold deposition, and confirmed peptide attachment, creating a targeted theranostic nanocarrier suitable for oral cancer applications. These findings establish a strong foundation for upcoming cellular uptake, targeting validation, photothermal efficiency, and

therapeutic studies, bringing the system closer to clinical translation.