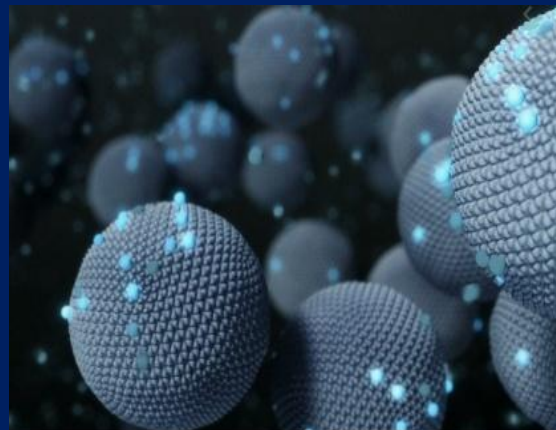
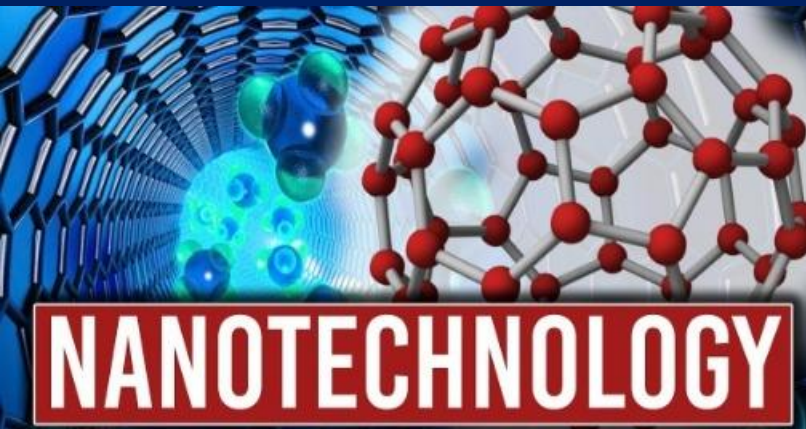


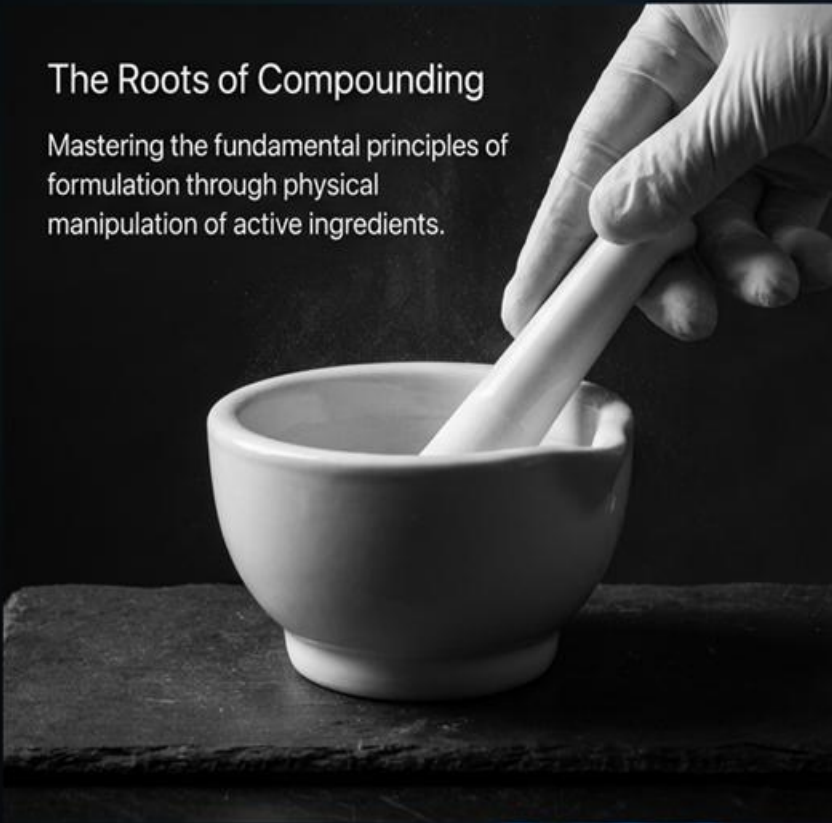
# Department of Pharmaceutics and Industrial Pharmacy Faculty of Pharmacy Ain Shams University



# The foundational cores of Department of Pharmaceutics and Industrial Pharmacy

## The Roots of Compounding

Mastering the fundamental principles of formulation through physical manipulation of active ingredients.



## The Scale of Production

Advancing to precision, large-scale industrial manufacturing while building on enduring theoretical frameworks.



# The Delivery Paradigm Shift



**Conventional Formulations**

**Advanced Drug Delivery Systems (DDS)**



Systemic and widespread distribution

**Mechanism of Action**

Targeted, high-precision binding

Passive absorption, hindered by natural barriers

**Penetration Strategy**

Active evasion via biomimetic architecture

Static, immediate, or sustained release

**Responsiveness**

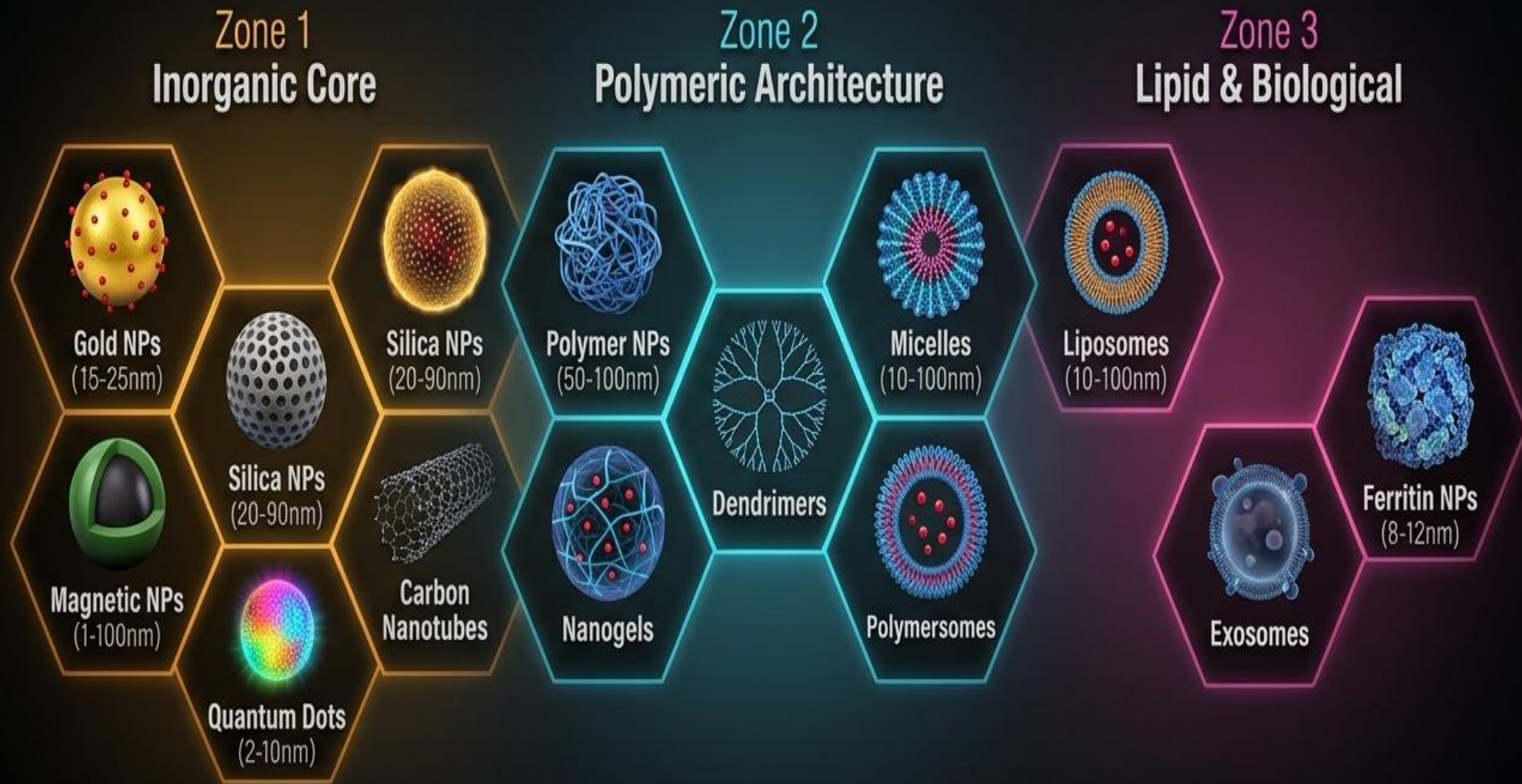
Dynamic, stimuli-responsive deployment (Heat, pH, Enzymes)

Pills, standard vials, topical creams

**Paradigmatic Form**

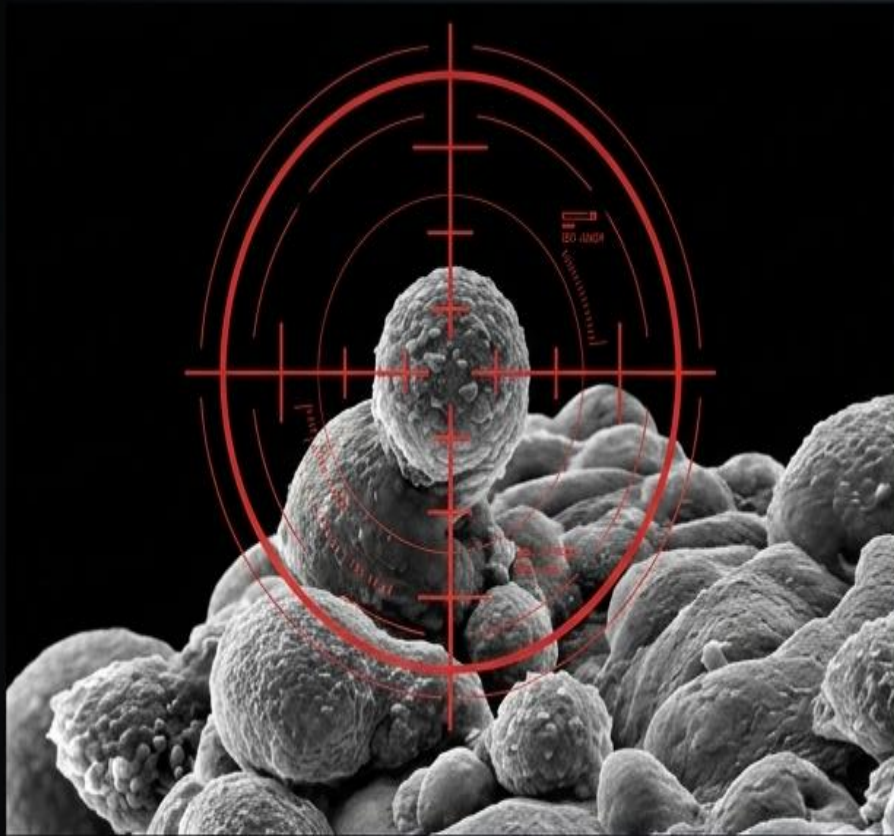
Liposomes, Core-Shell Nanoparticles, Nanobots

# The Ain Shams Arsenal: A Taxonomy of Nanocarriers



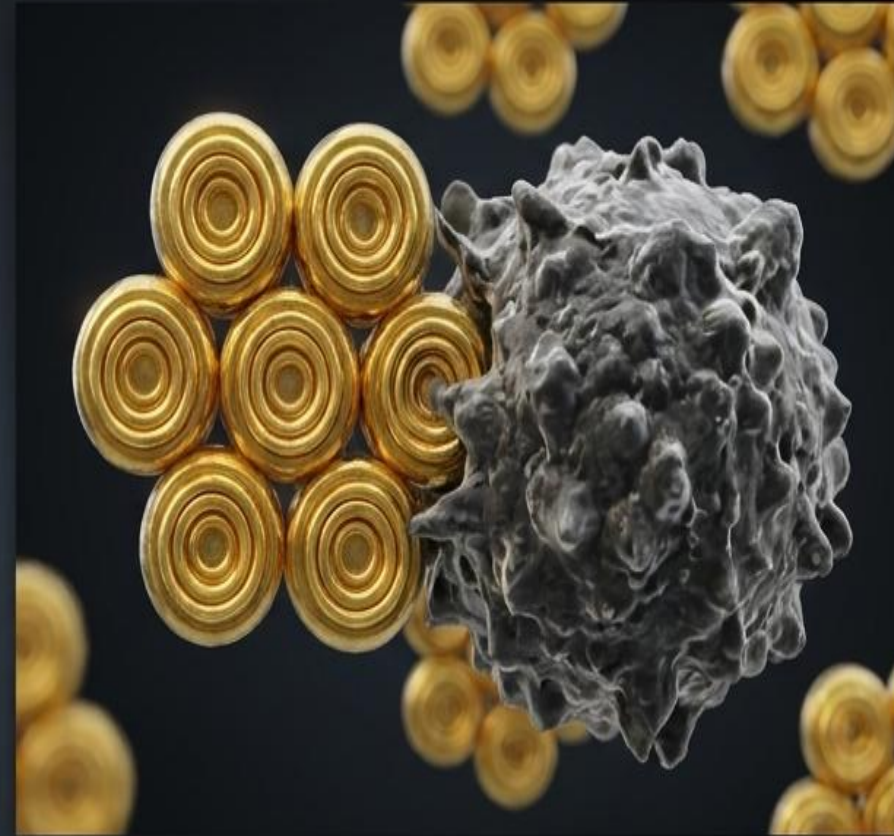
From quantum dots to bimetallic nanoalloys, the department custom-selects the carrier's physical scale and material properties to perfectly match the clinical payload.

# Drug Targeting: The Magic Bullet



## The Reticle

Engineering nanocarriers to bypass healthy tissue and lock exclusively onto the surface receptors of diseased cells.



## Helping the Beauty Cure the Beast

Utilizing elegantly designed, geometrically perfect nanostructures to deliver devastating anti-cancer agents to malignant tumors.

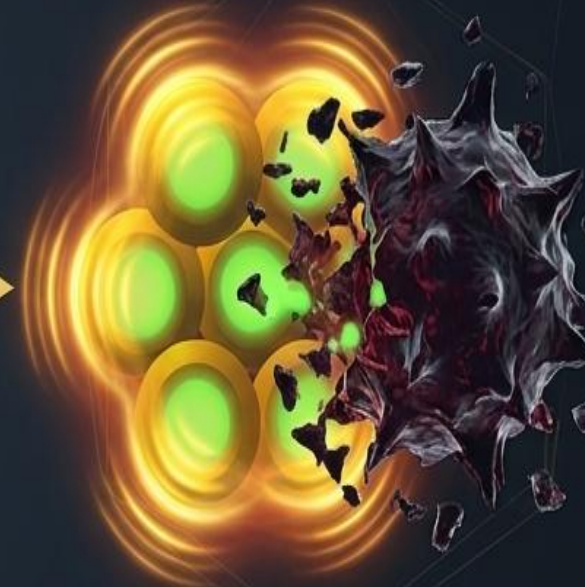
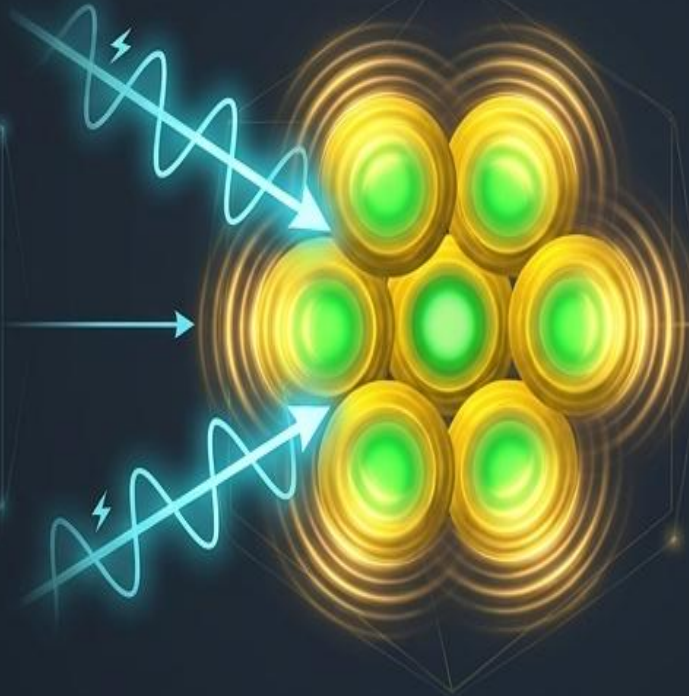
**Nano-Onco-Immunotherapy**

# Plasmonic Photothermal Therapy: "Curing the Beast"

The Beauty

The Trigger

Curing the Beast



The Beauty

The Trigger

Curing the Beast

Gold Nanoparticle with  
Green Anti-Cancer Payload

Cyan Light Excitation induces  
Surface Plasmon Resonance (SPR)

Localized Plasmonic Heat Dissolves  
Tumor Cell, Sparing Healthy Tissue

Issue 3, 2006

[Previous Article](#)

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From the journal:  
**Chemical Society Reviews**

**Why gold nanoparticles are more precious than pretty gold: Noble metal surface plasmon resonance and its enhancement of the radiative and nonradiative properties of nanocrystals of different shapes**

[Susie Eustis](#)<sup>a</sup> and [Mostafa A. El-Sayed](#)<sup>\*a</sup>



**Ppy-coated Gold NPs**



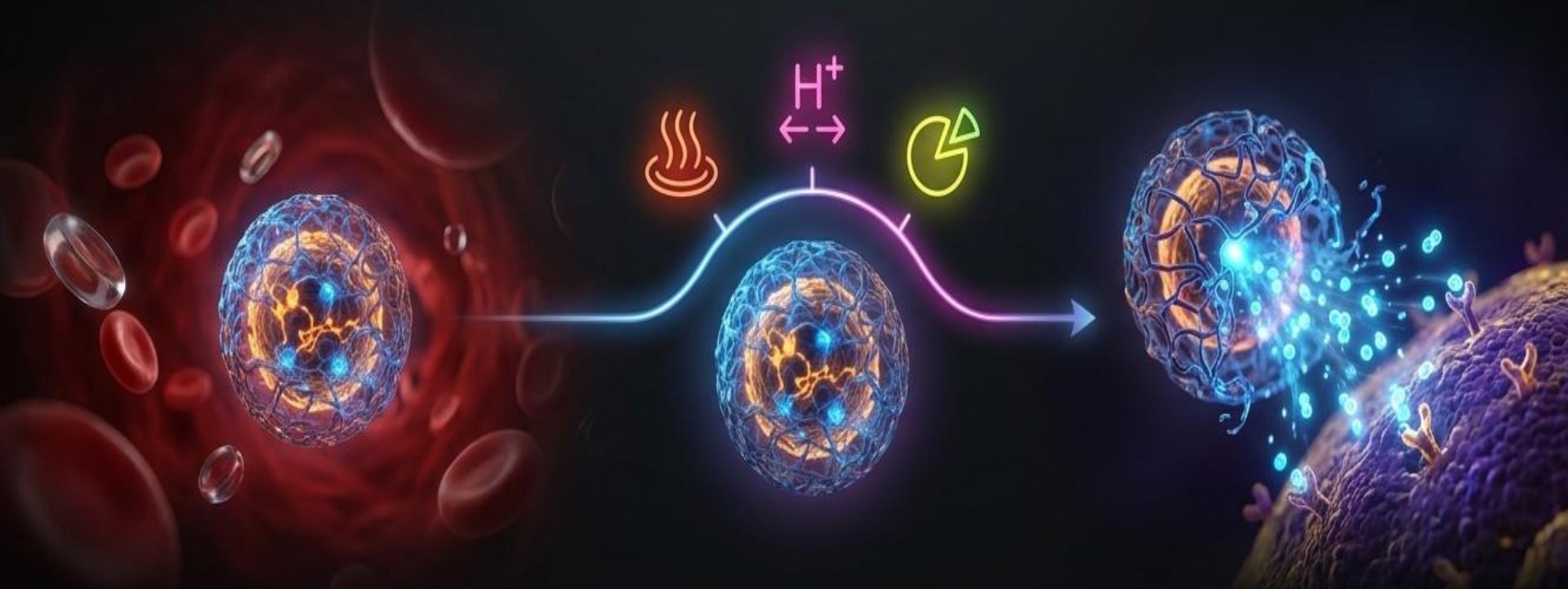
**Helping the beauty to beat “cure” the beast**

What if the developed system was loaded with an anti-cancer agent? .....



**triple**  
impact

# Stimuli-Responsive Architectures



## 1. Dormant Transit

Polymer matrices encapsulate and protect the therapeutic payload from premature degradation in the systemic circulation.

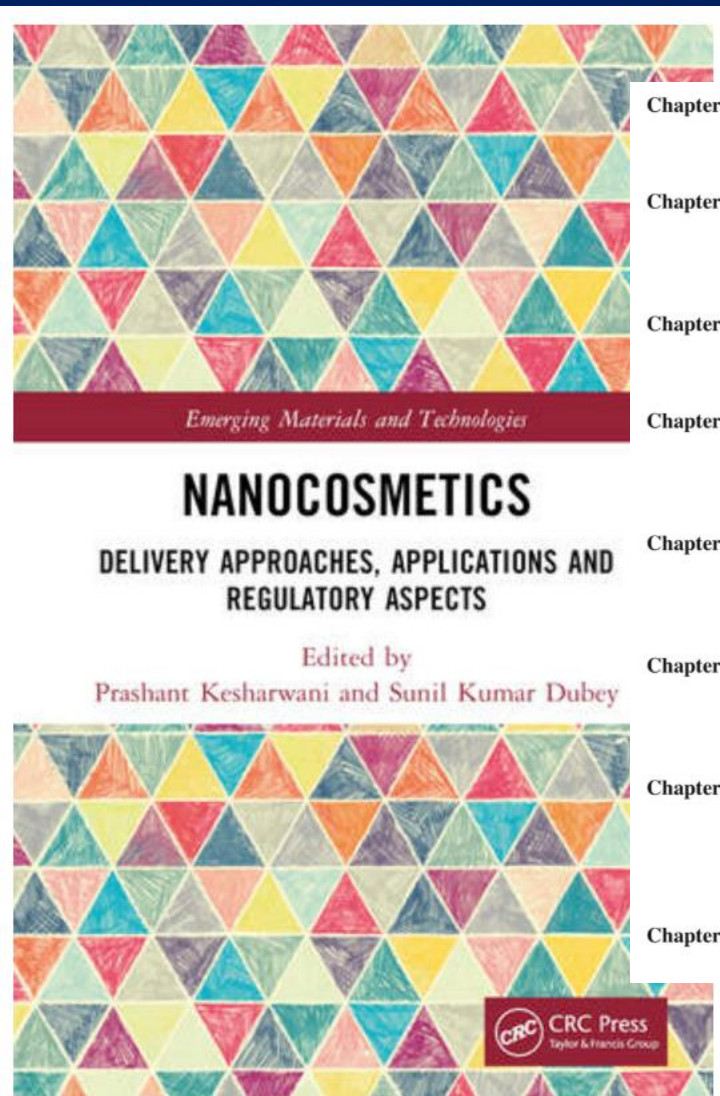
## 2. Environmental Trigger

The carrier encounters a specific localized stimulus engineered into its chemical design, such as hyperthermia, acidic shifts, or enzymatic presence.

## 3. Precision Deployment

The polymer dynamically alters its structure—swelling, dissolving, or cleaving bonds—to deploy the agent exactly at the highly acidic tumor microenvironment.

# Nanocosmetics



- Chapter 1** Cosmetics science and skin care: history and concepts ..... 1  
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# Engineering the Cosmetic Nanoscale



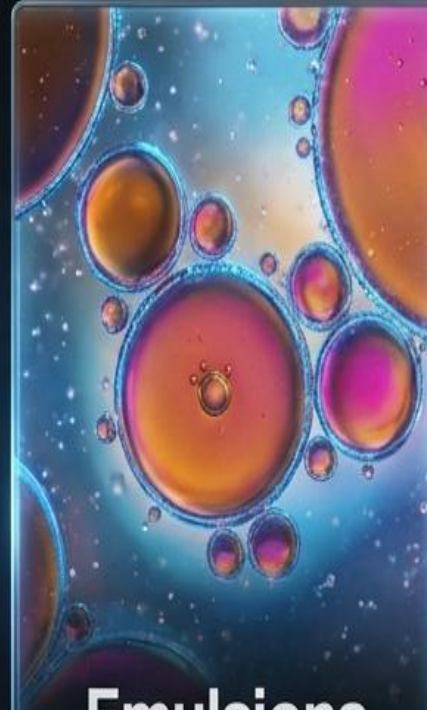
## Vesicular Systems

Liposomal and Niosomal delivery networks designed for deep epidermal integration.



## Polymeric & Micellar

Polymeric micelles and dendrimer architectures for highly stable formulations.



## Emulsions & Lipids

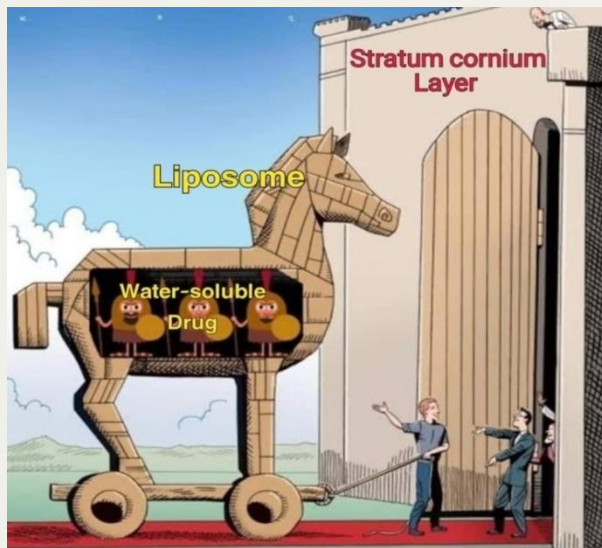
Nanoemulsions and solid lipid nanoparticles for enhanced barrier repair and moisture retention.



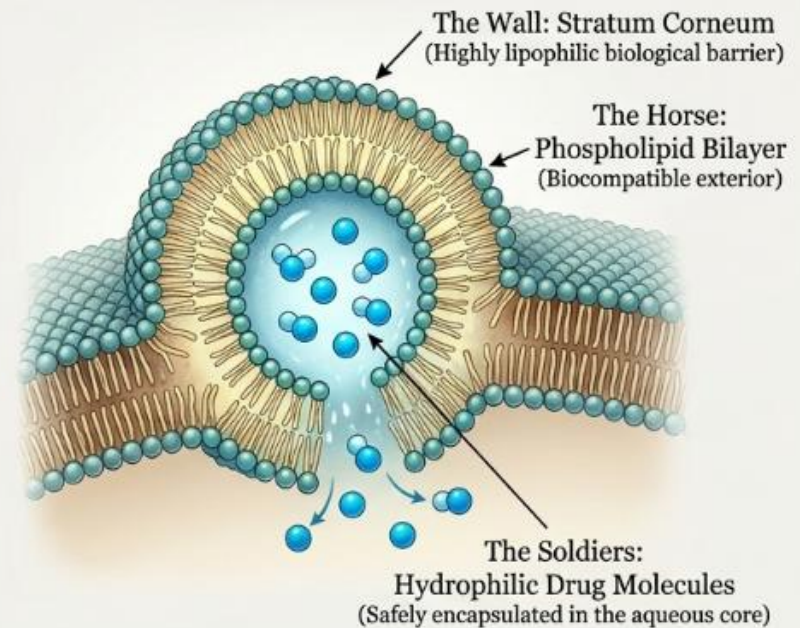
## Metallic & Novel

Nanosilver, nanogold, and nanostructured organic UV filters, paving the way for advanced Nanoperfumes.

# Bypassing Biological Fortresses



The Strategy: Disguising water-soluble payloads inside lipid-friendly vehicles.



Overcoming the fundamental barrier of transdermal and localized delivery without compromising the active pharmaceutical ingredient.

# Nano-onco-immunotherapy



*Article*

## Enhancing Effector Jurkat Cell Activity and Increasing Cytotoxicity against A549 Cells Using Nivolumab as an Anti-PD-1 Agent Loaded on Gelatin Nanoparticles

Dalia S. Ali <sup>1</sup>, Heba A. Gad <sup>2,3</sup>  and Rania M. Hathout <sup>2,\*</sup> 


<sup>1</sup> Department of Biotechnology, Central Administration of Biological, Innovative Products and Clinical Studies, Egyptian Drug Authority, Giza 11566, Egypt

<sup>2</sup> Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo 11566, Egypt

<sup>3</sup> Pharmacy Program, Department of Pharmaceutical Sciences, Batterjee Medical College, Jeddah 21442, Saudi Arabia

\* Correspondence: r\_hathout@yahoo.com or rania.hathout@pharma.asu.edu.eg

# Green synthesis of drug-loaded NPs

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Volume 324, 15 January 2024, 121526

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Merna H. Emam, Reham S. Elezaby, Shady A. Swidan, Samah A. Loutfy, Rania M. Hathout 





First published: 01 April 2025 | <https://doi.org/10.1002/ardp.202400943> | Citations: 1

# Development of new drug delivery systems at the department

materialstoday  
CHEMISTRY

Volume 27, January 2023, 101266

## Tripodal amphiphilic pseudopeptidic nanovesicles as *p*-coumaric acid delivery systems for brain cancer cells

A.H. Lotfallah<sup>a</sup>, J.J. Andreu<sup>b</sup>, R.M. Hathout<sup>c</sup>  , D.H. Kassem<sup>d</sup>, S.S. Ibrahim<sup>c</sup>, B. Altava<sup>b</sup>  , E. García-Verdugo<sup>b</sup>, S.V. Luis<sup>b</sup>

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Journal of Pharmaceutics

January 2026, 126370



## nanomedicine: *p*-coumaric acid and chitosomes for hypertension

Shaimaa S. Ibrahim<sup>b</sup>, Enas Elmowafy<sup>b</sup>,

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*Archives of Pharmaceutical Sciences Ain Shams University 2026; Vol. 10(1): 17-26*



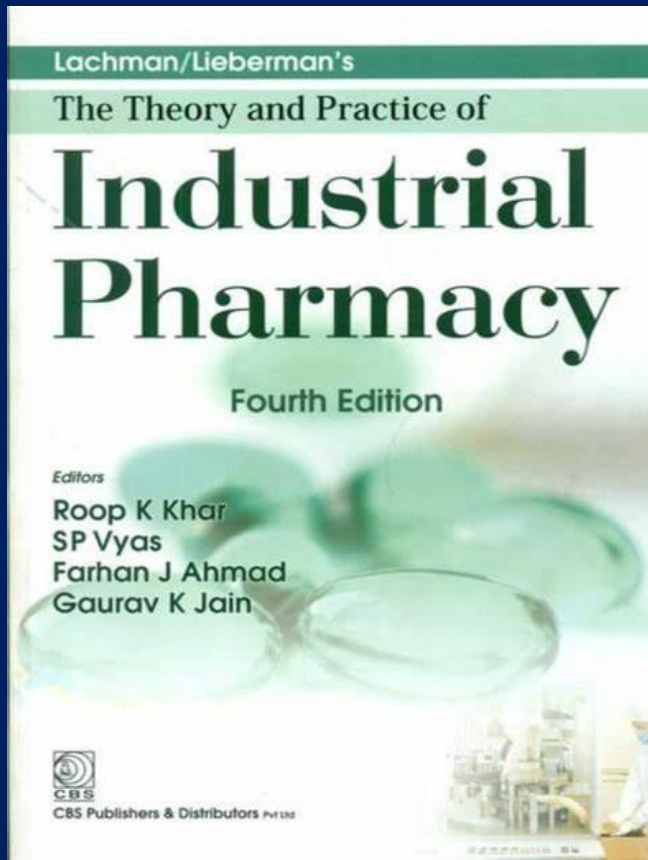
## Spanning a quarter century: Tales of three inspiring Nobel prizes that enriched the drug delivery field

Rania M. Hathout<sup>a\*</sup>, Ahmed G. A. Abdelhamid<sup>b</sup>

<sup>a</sup>Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo 11566, Egypt

<sup>b</sup>Université de Grenoble-Alpes, Institute for Advanced Biosciences, INSERM U1209, CNRS UMR 5309, Grenoble, France

# Industrial Pharmacy and Pharmaceutical Technology



# The Digital Frontier: Computational Pharmaceuticals

Vikas Anand Saharan *Editor*

Computer Aided  
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**Pharmaceutics Informatics:  
Bio/Chemoinformatics in Drug Delivery**

**24**

Rania M. Hathout and Abdelkader A. Metwally

DE GRUYTER

**COMPUTATIONAL  
DRUG DELIVERY**

MOLECULAR SIMULATION FOR PHARMACEUTICAL  
FORMULATION

## Bio/Chemoinformatics

Utilizing advanced algorithms to model drug-receptor interactions and optimize delivery pathways in silico before physical trials begin.

## Artificial Intelligence

Deploying sophisticated AI frameworks to accurately predict the behavior, systemic toxicity, toxicity, and release kinetics of complex delivery architectures.

## Molecular Simulation

Advancing chemical engineering by simulating the precise physical properties of bimetallic trimers and three-dimensional reconstructions of nanofibrous membranes.

# Nanoscience and Nanotechnology

AAP Research Notes on  
Nanoscience & Nanotechnology

## Chemical Nanoscience and Nanotechnology

New Materials and Modern Techniques



Francisco Torrens | A. K. Haghi  
Tanmoy Chakraborty

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# Architecting the Minds: Educational Research

## Research Methodology & Ethics

Establishing rigorous, globally minded standards and ethical frameworks for the next generation of pharmaceutical scientists.

## Quality by Design (QbD)

Embedding the principles of Design of Experiments (DoE) into student curricula, shifting paradigms from trial-and-error to systematic, statistically driven formulation.

## Transdisciplinary Teaching

Fostering multidisciplinary, interdisciplinary, and transdisciplinary chemistry activities in higher education to build well-rounded, innovative thinkers.

