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THE UNIVERSITY OF TRIPOLI

WP4 Program

Work Package 4: Presentation of the Project “Preparation of Some Metal Nanoparticles Using Caper Plant”

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Nanomaterials have a wide range of applications:

- **Biotechnology** - Medicines – Developing technology to treat cancer (especially breast cancer)
- **physics** - Developing super computer
- **Electronics** - developing conductors and semi-conductors
- **Agriculture** - nano-formulations of agrochemicals for applying pesticides and fertilizers for crop improvement.
- **chemistry** - Getting a single molecule or a very small collection of molecules to serve as circuits, capacitors, resistors and magnets.

How old is nanotechnology?

Nanotechnology has been introduced first by Feynman in **1959**

By the end of **2013**, There were about **1700** nanotechnology products, especially in medicine and agriculture

So many researches for a different application have been conducted consecutively.



Terminology

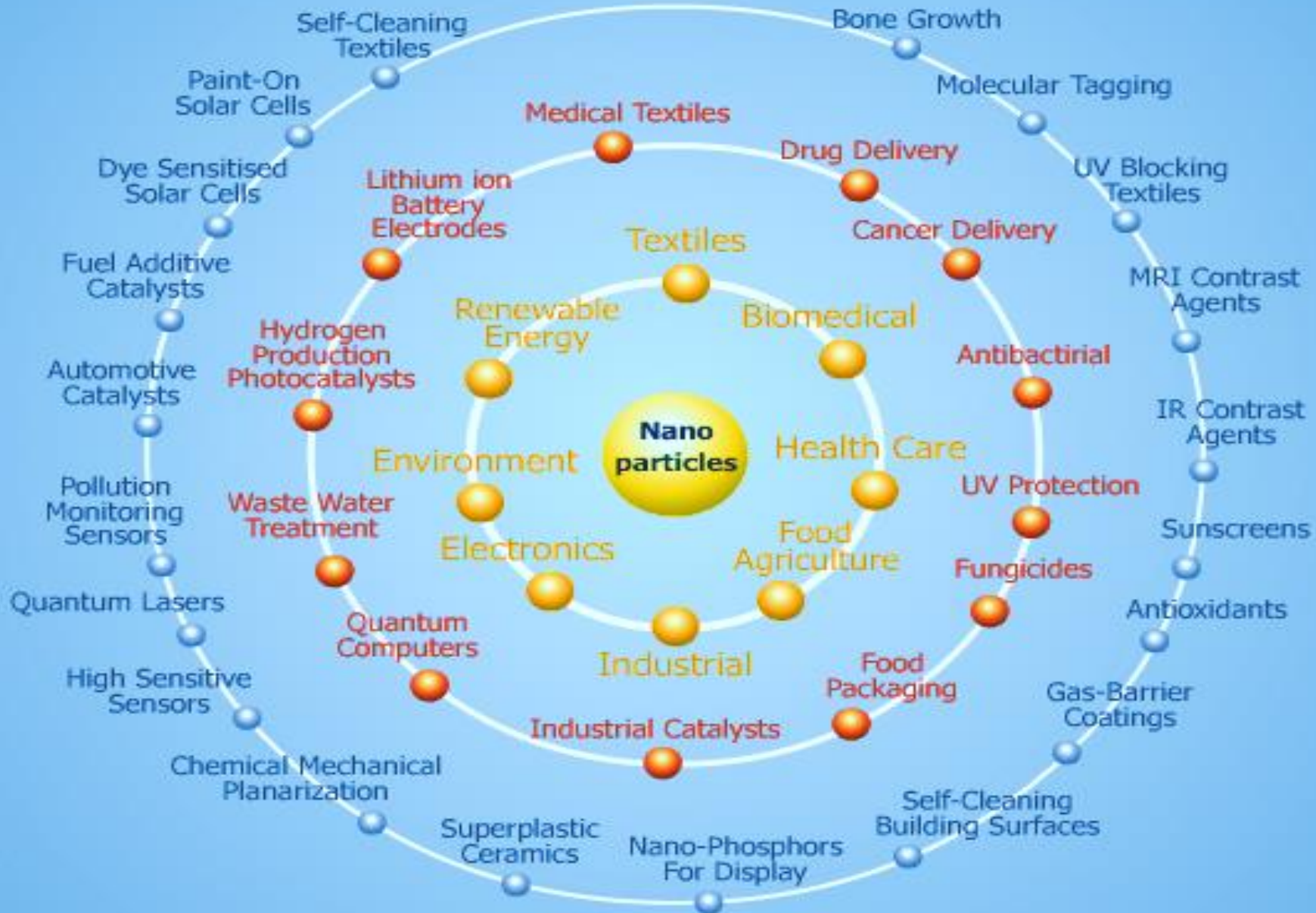
Nanoparticles are microscopic materials that possess a particle size in the range of **1-100nm**.

Green Chemistry: The use of less hazardous, eco-friendly substances in the design and synthesis of nanoparticles such as bacteria, yeasts and plants.

Advantages of nanoparticles Properties

- Mechanical strength**
- Thermal stability**
- Electrical conductivity**
- Catalytic activity**
- Magnetic properties**

APPLICATION OF NANOPARTICLES



DNA labelling, biosensors
Drug delivery, cancer therapy, antimicrobial

Anti-cancer
Anti-microbial

Gold

Biocatalysis

Selenium

Palladium

Anti-cancer

Platinum

Metal nanoparticles

Copper

Antimicrobial

Silver

Iron

Anti-cancer
Anti-microbial
Anti-viral

Zinc Oxide

Anti-cancer,
Molecular imaging
Cancer therapy

Cosmetics, coatings, Medicine, electronics,
building materials, dentistry



Nanoparticle synthesis

Grinding system,
Ultrasonication, laser
ablation,
irradiation...etc

Physical Methods

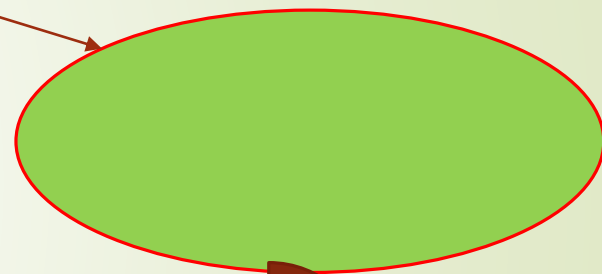
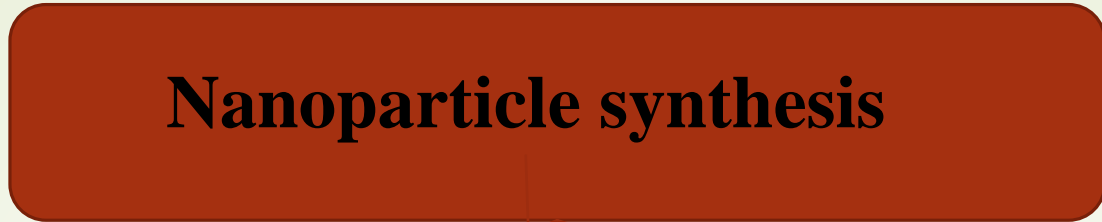
Time and energy
consuming (high
T and P)

Chemical vapour
deposition, chemical
reduction,
solvothermal , sol-gel

Chemical Methods

Simple, low temperature, use of
toxic reducing and stabilizing
agents.

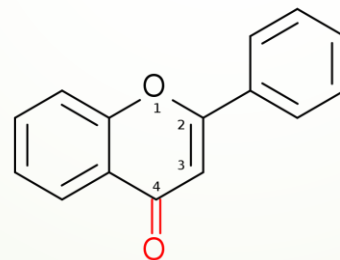
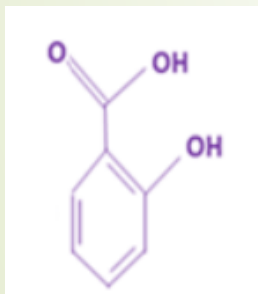
Easy, efficient, less energy,
eliminates the use of toxic
chemicals, produce safer
products and by products.



Why capers plant?



- Caper is a **Mediterranean wild plant**, and naturally grows in many countries like Italy Spain, Algeria, Tunis Morocco and Libya etc
- It can easily have cultivated in farms and grows in numerous types of soil.
- Caper plant contains a lot of compounds such as proteins, phenols and flavonoids ...etc



- These components and others may can help to reduce metal salts to nanoparticle elements or oxide.

Instrumentation Required

- ✓ **Modern UV-Visible spectrophotometer, complete with computer and operating software.**
- ✓ **FT-IR spectrophotometer, complete with computer, operating software and library.**
- ✓ **Benchtop pH-mV Meter, 0 to 14 pH Range, +/- 0.02 pH Accuracy, 0.01 Resolution.**
- ✓ **Scanning Electron Microscope (SEM) and or Transmission Electron Microscope (TEM)**
- ✓ **Ordinary laboratory consumables and chemicals**

Project time table

Project states	Months				
	1	2	3	4	5
Literature survey	Active	Active			
Sample collection		Active			
sample preparations			Active	Active	
sample analysis and characterization			Active	Active	
Writing the report				Active	Active

Estimated budget

S. N	ITEMS	AMOUNT (euro)
1	Instruments and equipments	29,150
2	Consumables	785
3	Researcher financial reward	11,250
	TOTAL	41,185

Enjoy Pizza with capers

