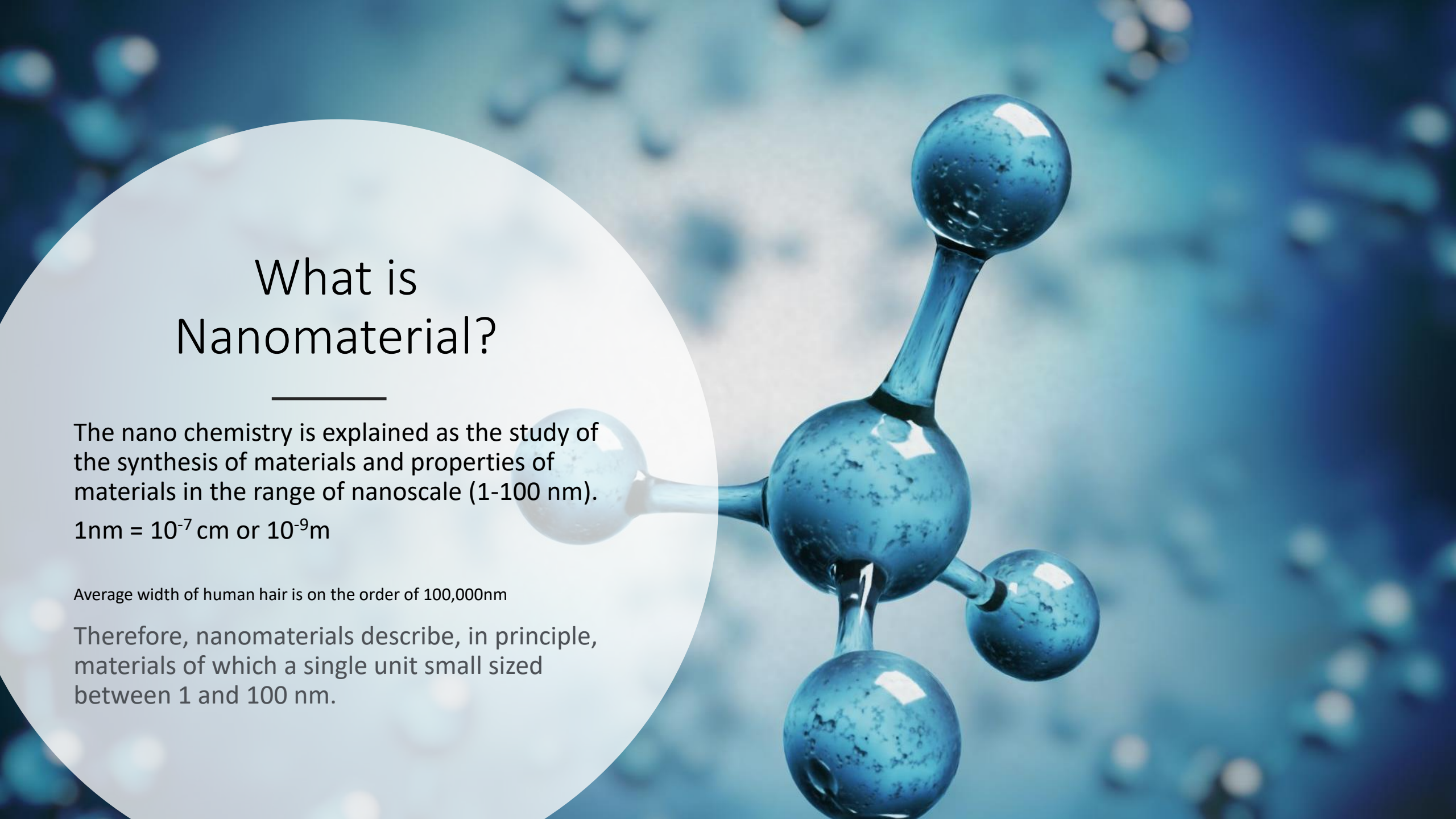
What is Nanomaterial?

The nano chemistry is explained as the study of the synthesis of materials and properties of materials in the range of nanoscale (1-100 nm).

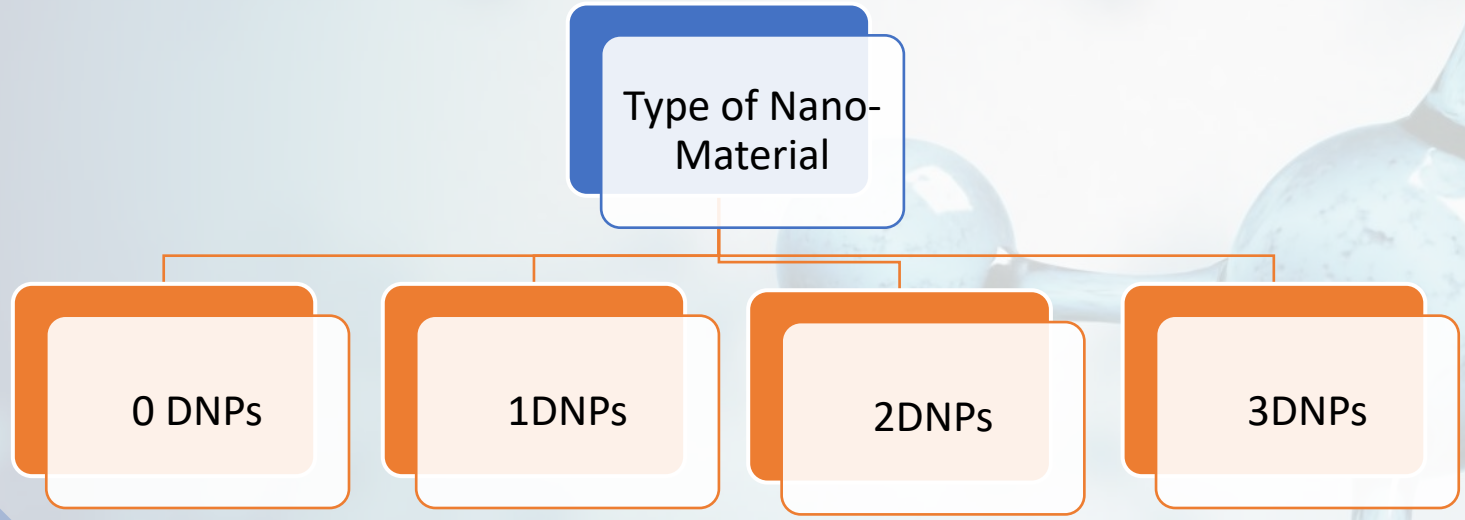
1nm = 10^{-7} cm or 10^{-9}m

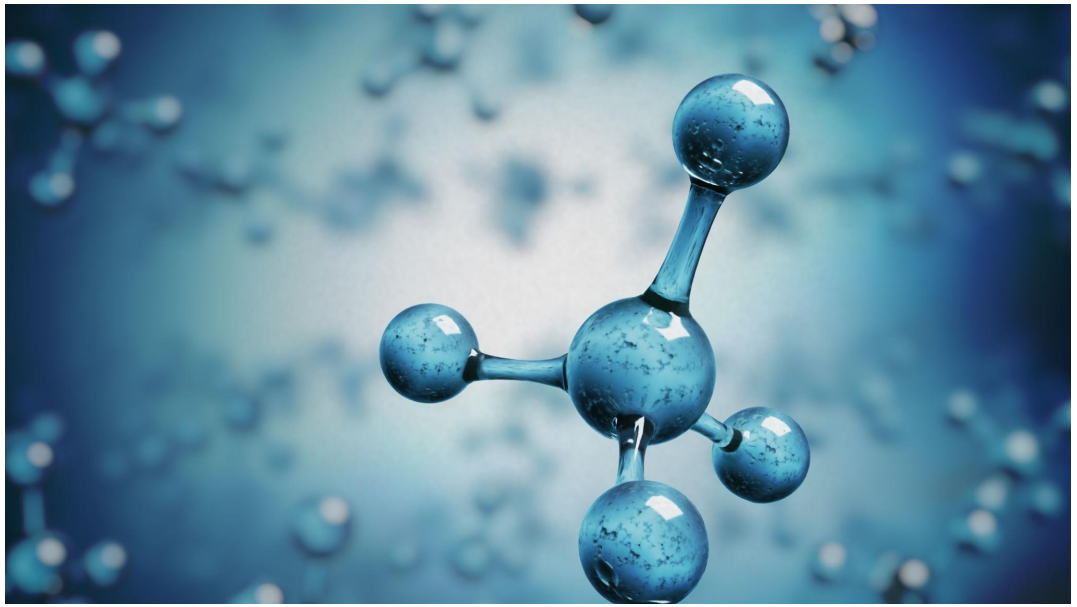
Average width of human hair is on the order of 100,000nm

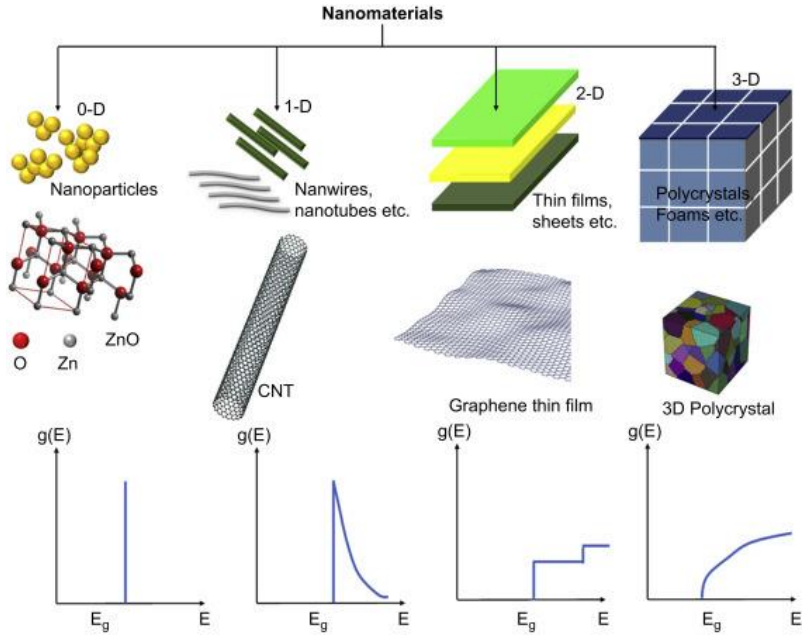
Therefore, nanomaterials describe, in principle, materials of which a single unit small sized between 1 and 100 nm.



Classification of Nanomaterial?





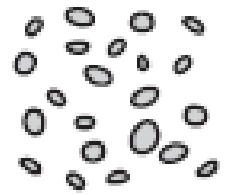


Classification of Nanomaterial?

Classification of Nanomaterial?

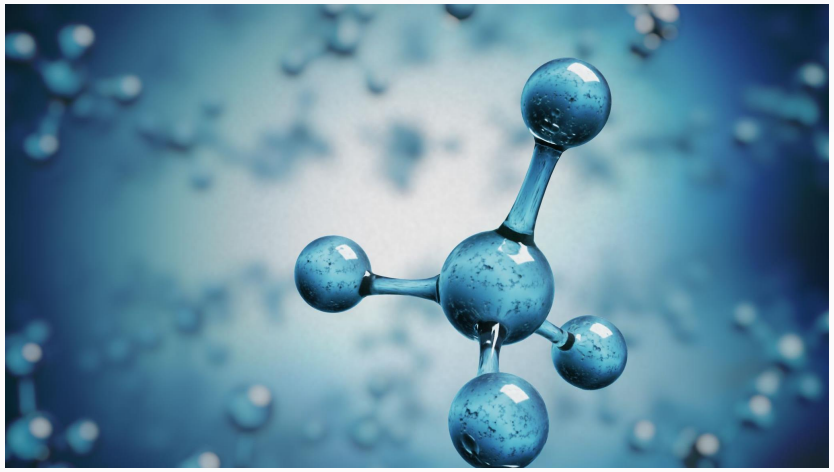
0-D

All dimensions (*x*,*y*,*z*) at nanoscale



d ≤ 100 nm

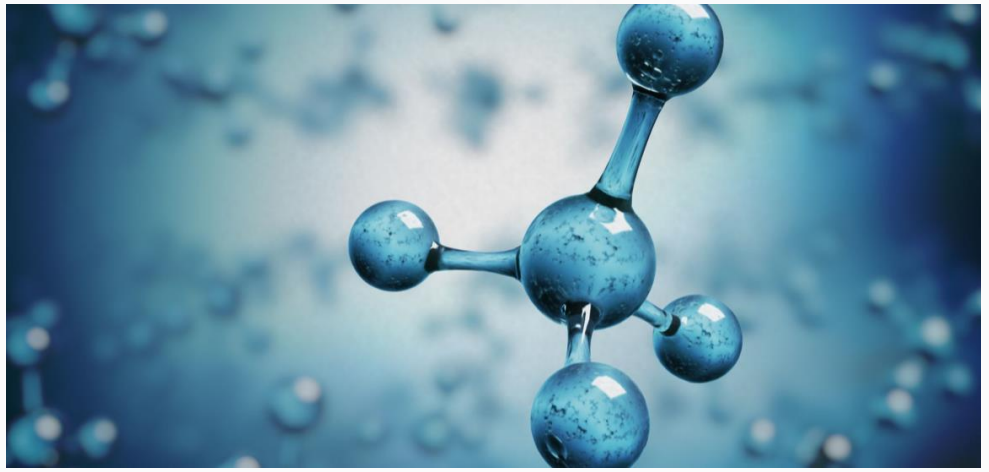
Nanoparticles



Classification of Nanomaterial?

1-D

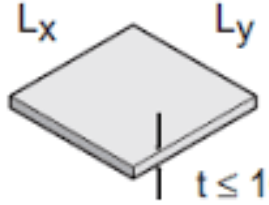
Two dimensions (*x*,*y*) at nanoscale, other dimension (*L*) is not



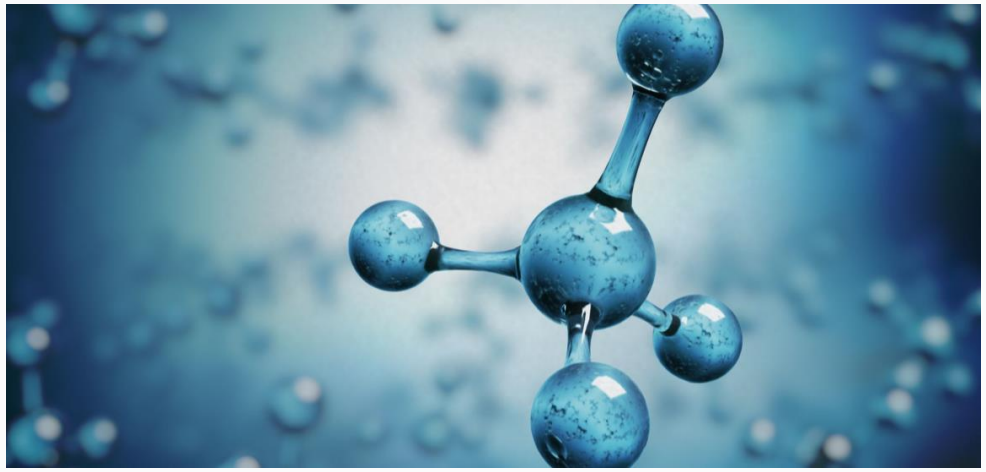
Classification of Nanomaterial?

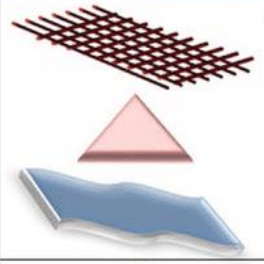
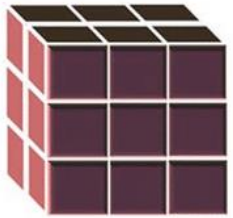
2-D

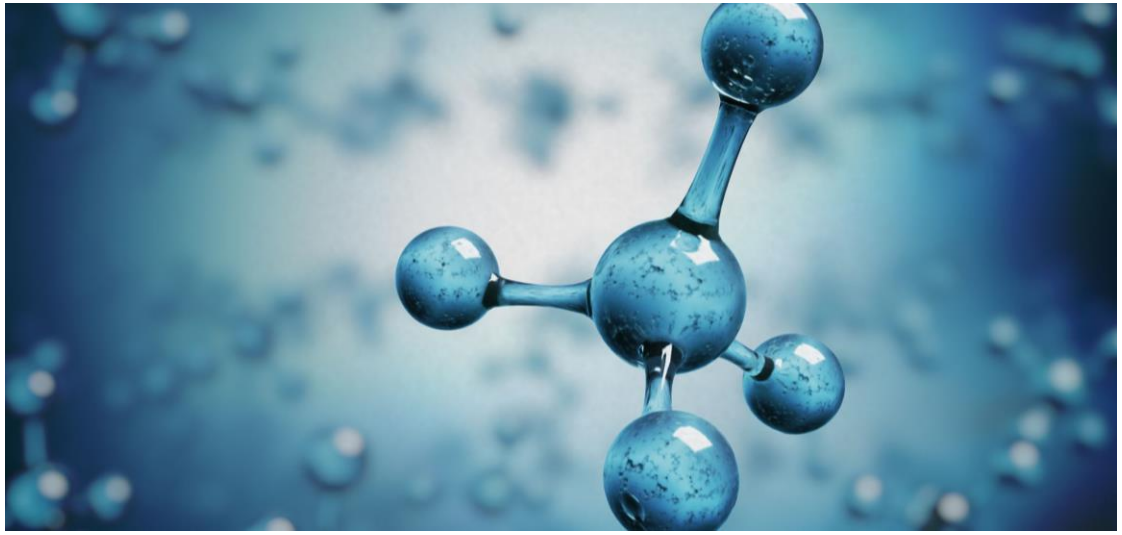
One dimension (t) at nanoscale, other two dimensions- (L_x, L_y) are not



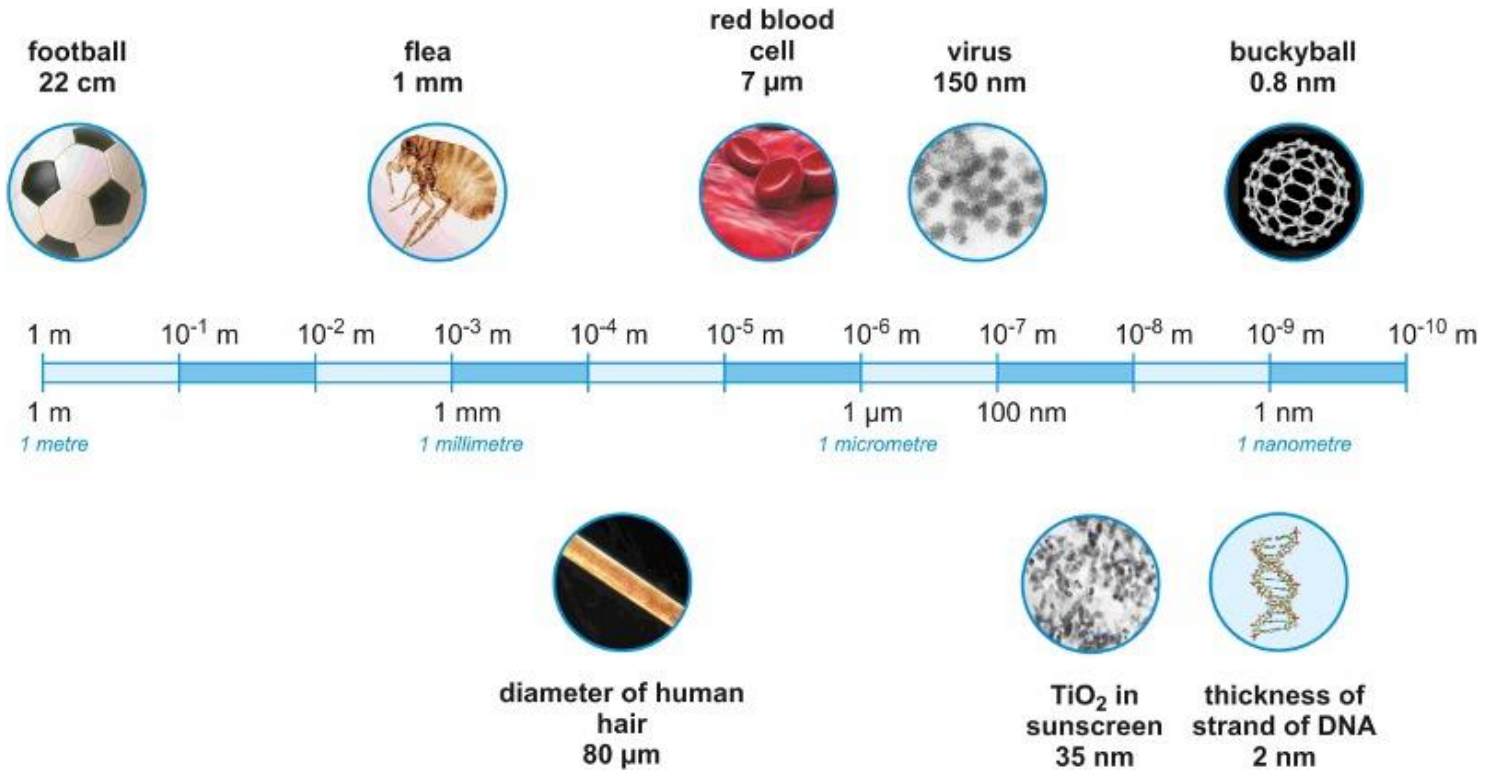
Nanocoatings and nanofilms

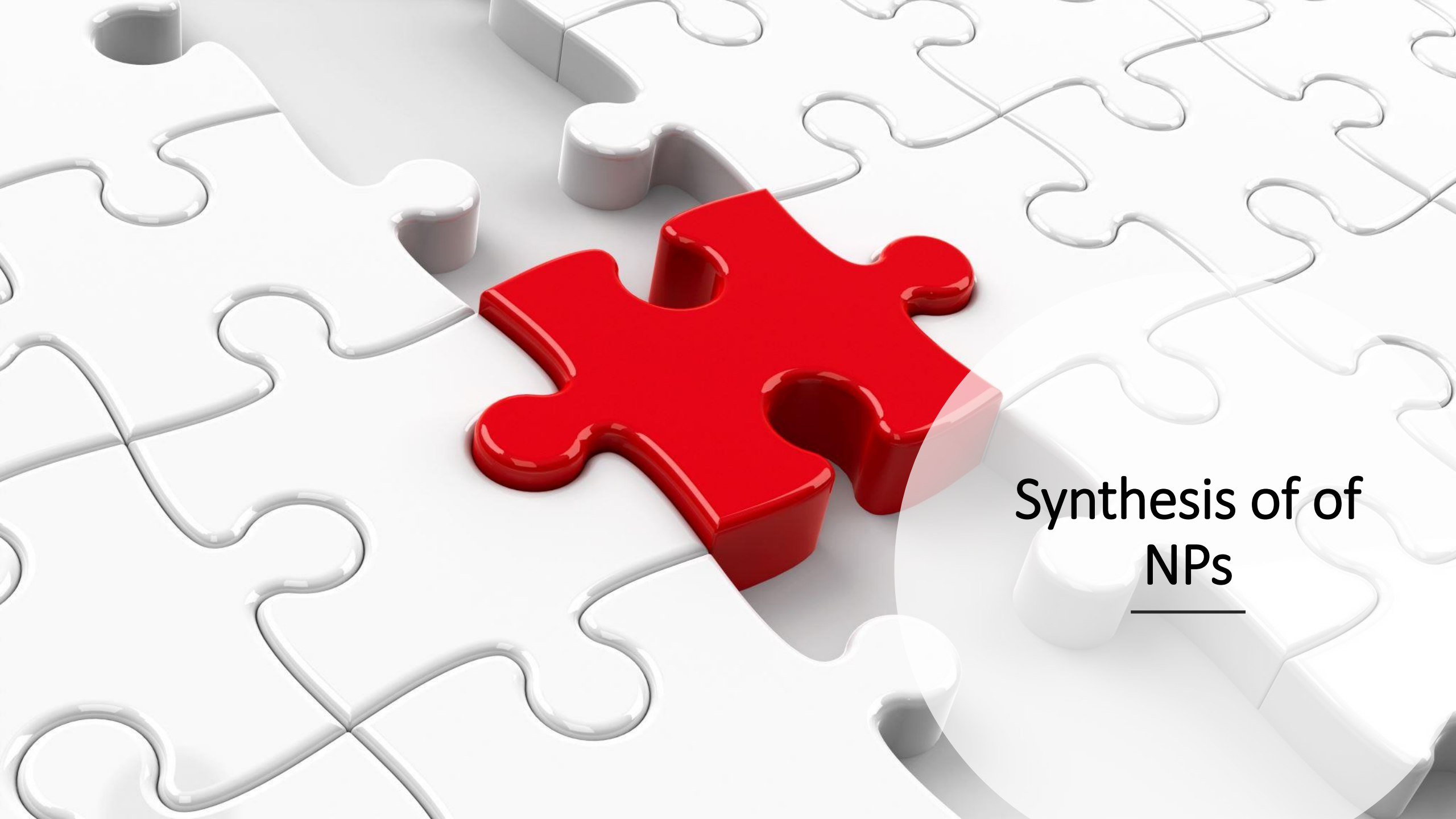


Isotropic nanomaterials	Anisotropic nanomaterials		
			
0D	**1D**	**2D**	**3D**
Spheres, Clusters	**Nanorods, wires**	**Nanofilms, plates**	**Nanoparticles**



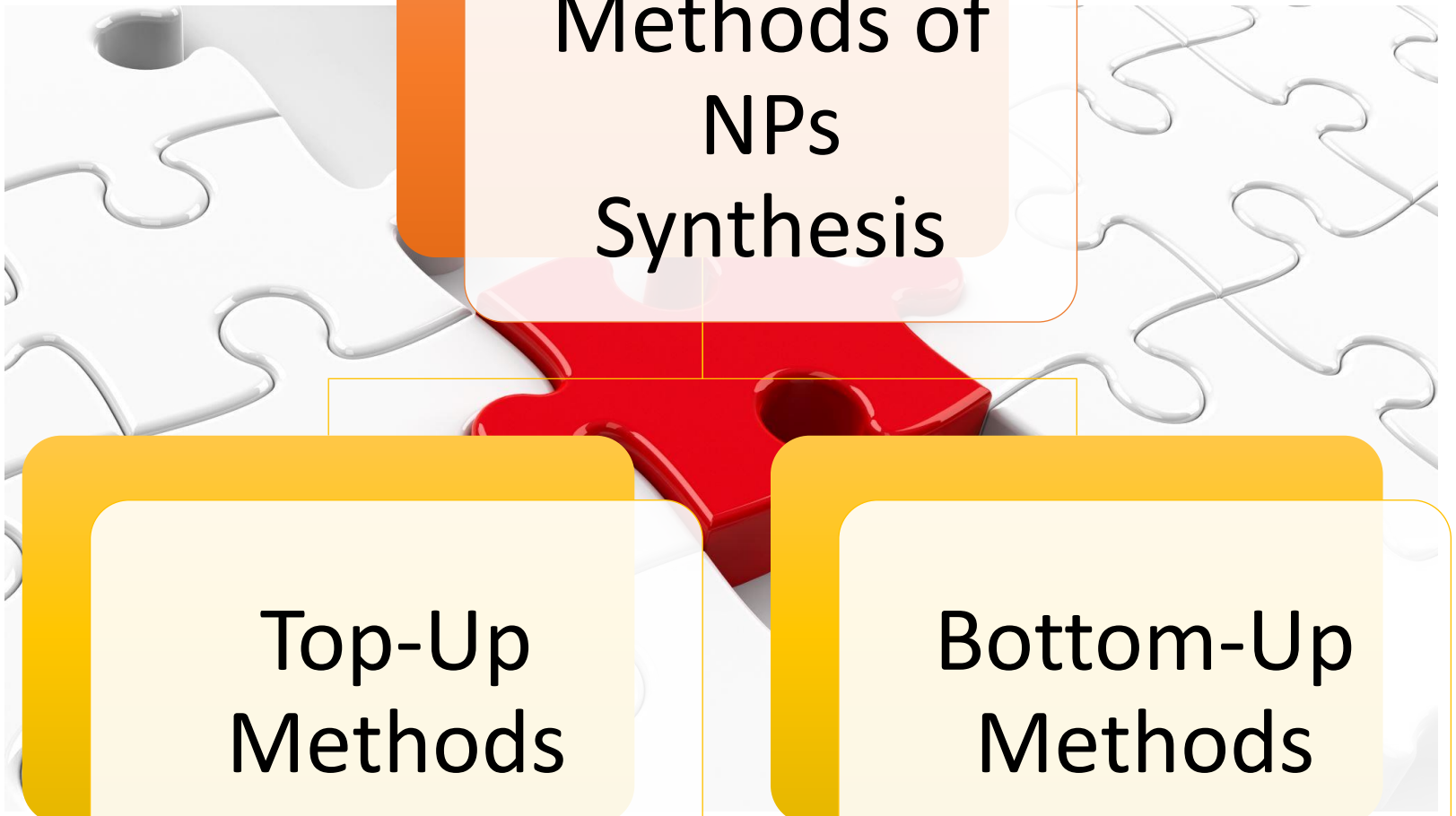
Visualization of NPs





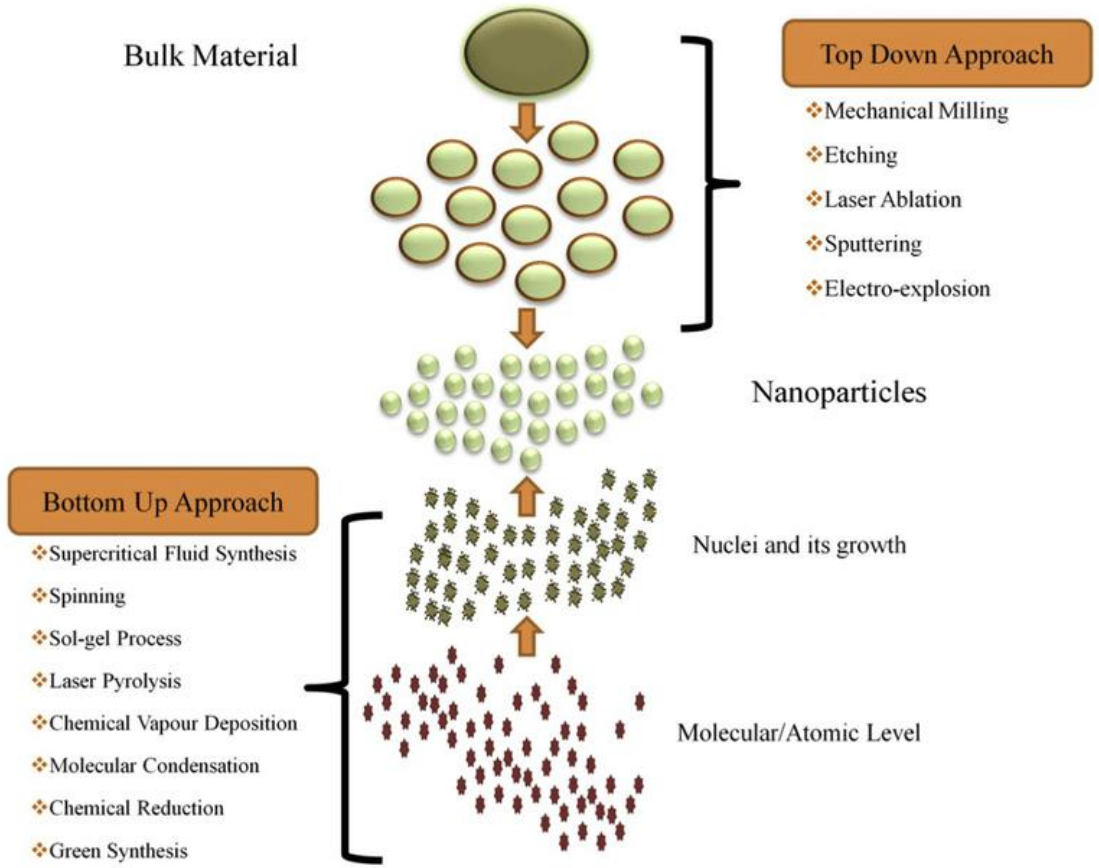
Synthesis of of NPs

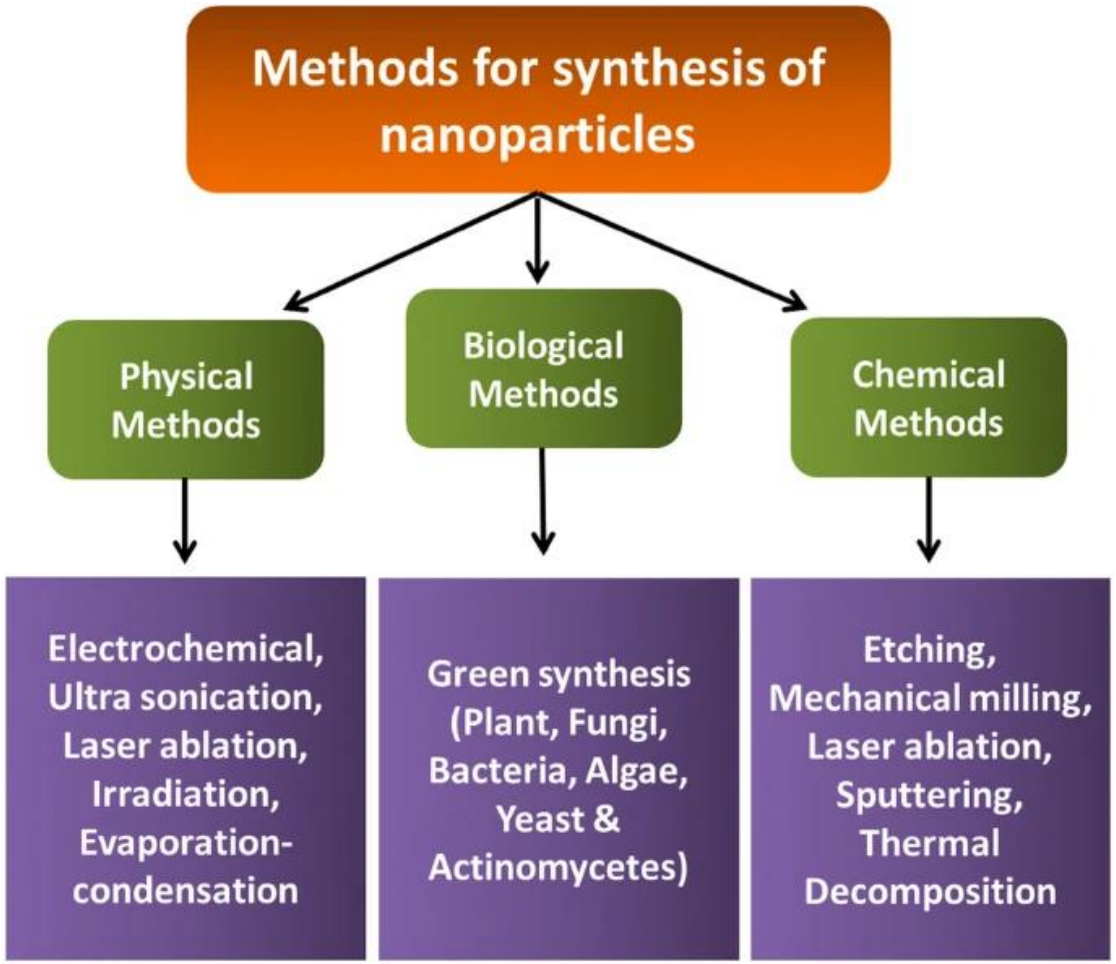
Methods of NPs Synthesis

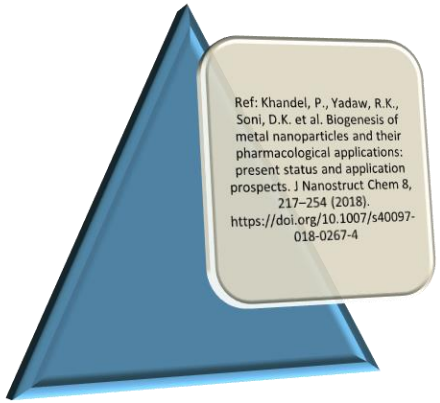


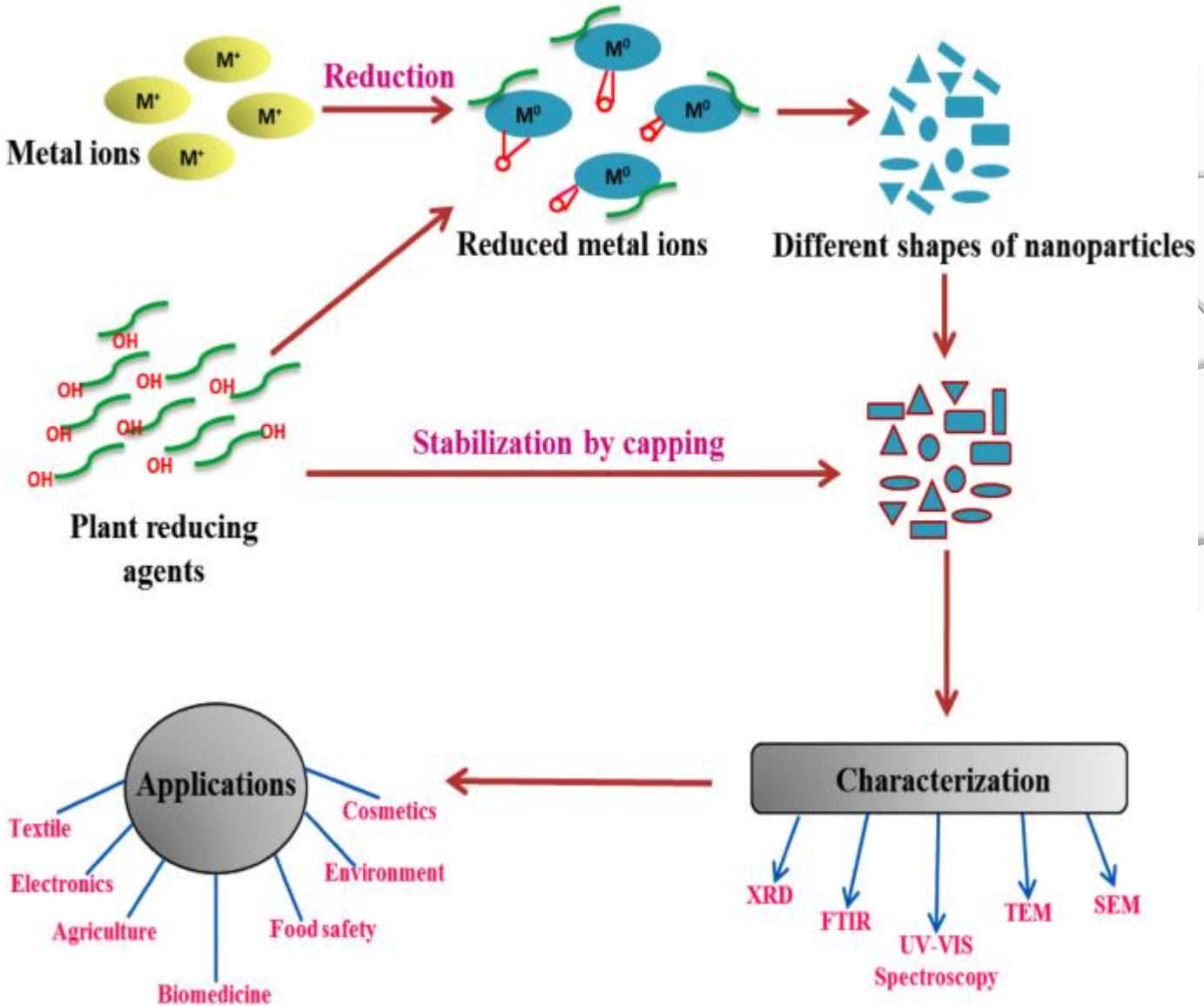
Top-Up Methods

Bottom-Up Methods


Bulk Material
Top Down Approach
Mechanical Milling
Etching
Laser Ablation
Sputtering
Electro-explosion
Nanoparticles
Bottom Up Approach
Supercritical Fluid Synthesis
Spinning
Sol-gel Process
Laser Pyrolysis
Chemical Vapour Deposition
Molecular Condensation
Chemical Reduction
Green Synthesis
Nuclei and its growth
Molecular/Atomic Level

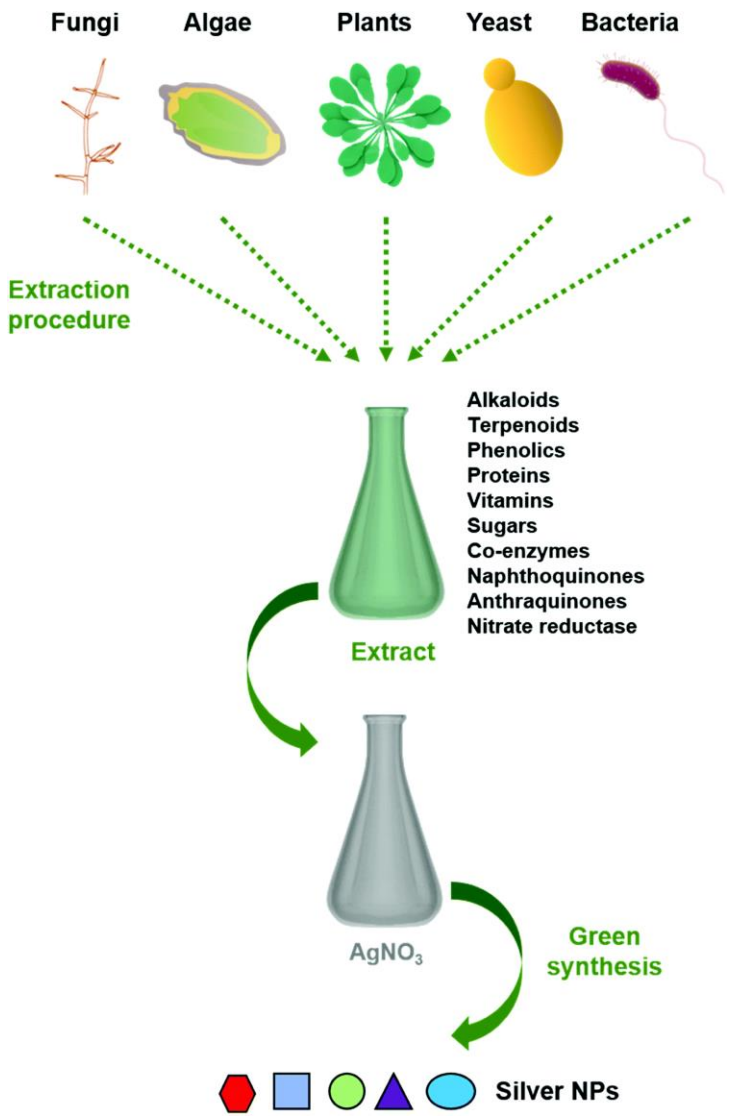

Methods for synthesis of nanoparticles
Physical Methods
Biological Methods
Chemical Methods
Electrochemical, Ultra sonication, Laser ablation, Irradiation, Evaporation-condensation
Green synthesis (Plant, Fungi, Bacteria, Algae, Yeast & Actinomycetes)
Etching, Mechanical milling, Laser ablation, Sputtering, Thermal Decomposition

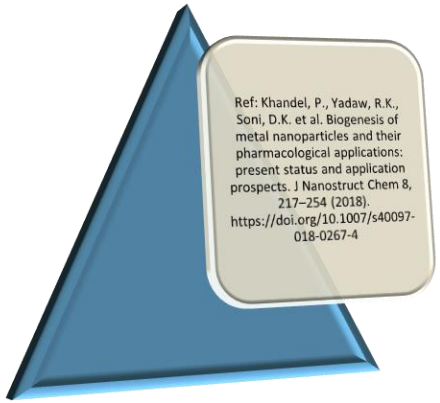

Ref: Khandel, P., Yadaw, R.K., Soni, D.K. et al. Biogenesis of metal nanoparticles and their pharmacological applications: present status and application prospects. J Nanostruct Chem 8, 217–254 (2018). https://doi.org/10.1007/s40097-018-0267-4



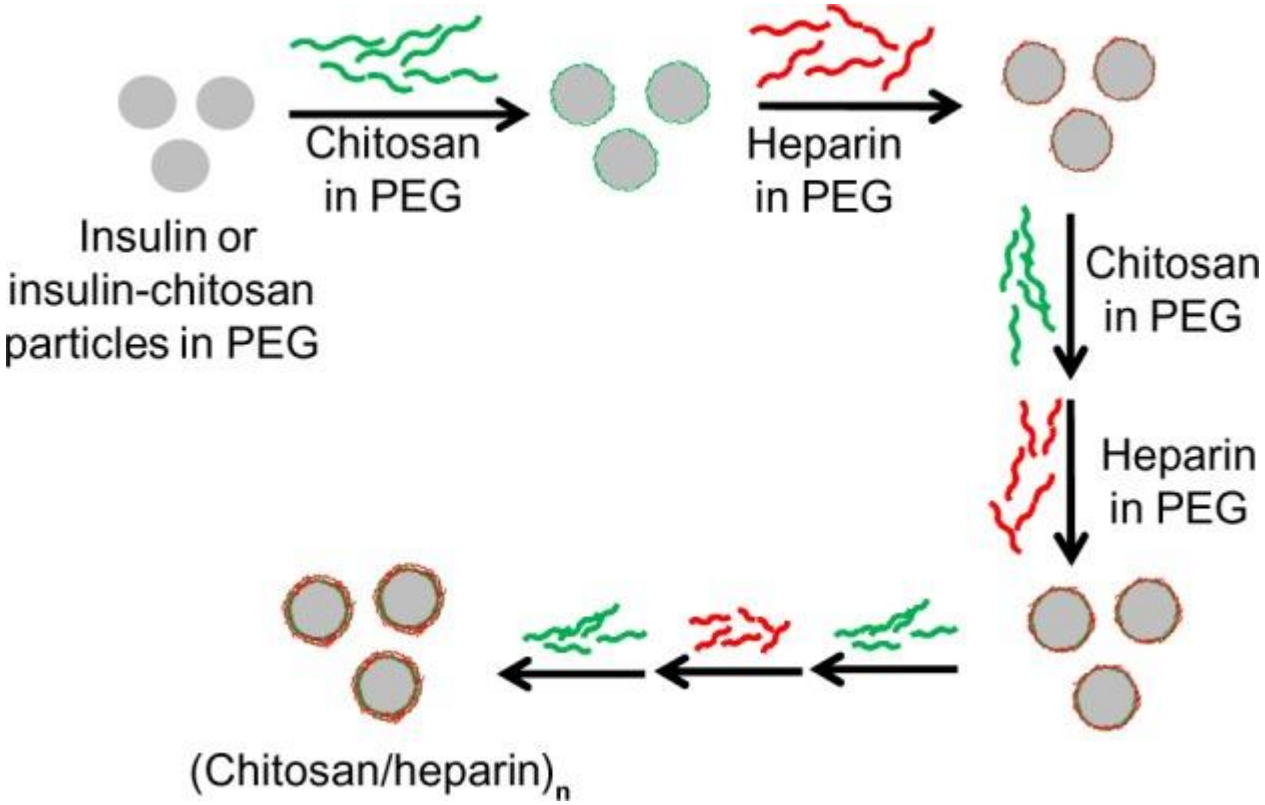
Ref: Khandel, P., Yadaw, R.K., Soni, D.K. et al. Biogenesis of metal nanoparticles and their pharmacological applications: present status and application prospects. J Nanostruct Chem 8, 217–254 (2018). https://doi.org/10.1007/s40097-018-0267-4

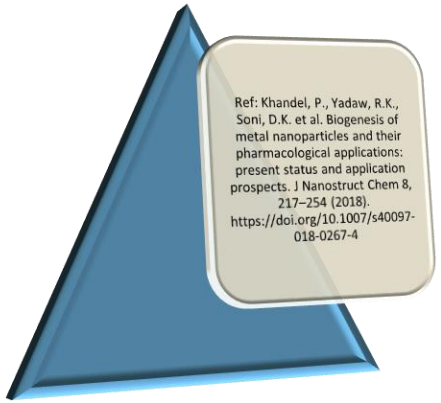
Green Synthesis of NPs



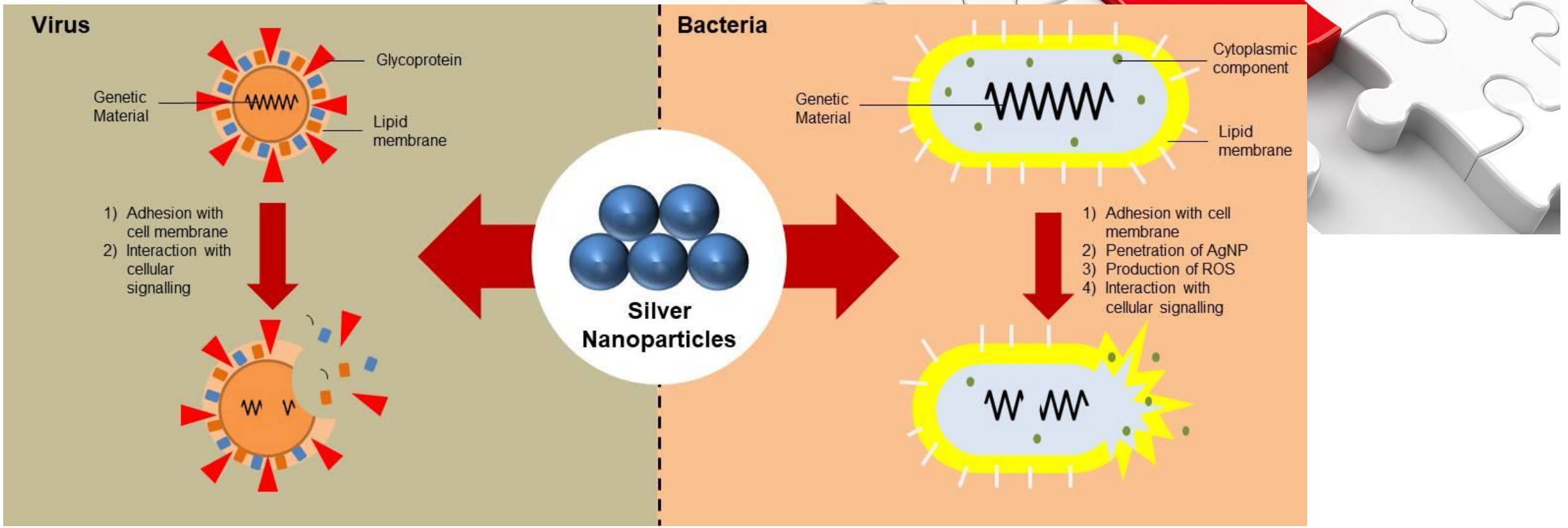


NPS in Medicine





Antibacterial & Antiviral Properties of Ag NPs



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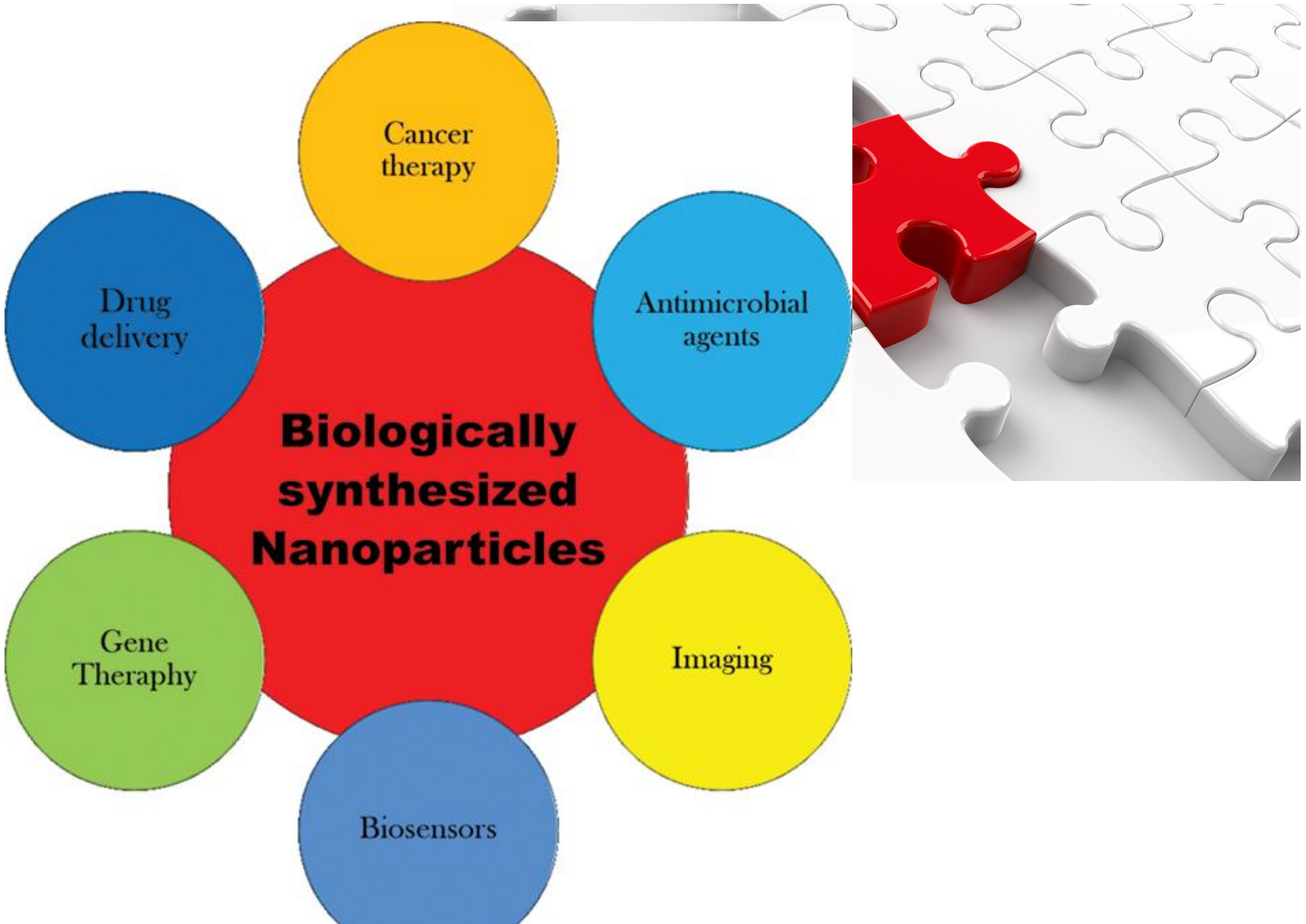
Nanomedicine



Thank you !