



$E = hf$
 $KE_{max} = EPE$
 $hf = \phi + E_{kmax}$
 $E_0 = hf - \phi$
 $KE_{max} = EPE$
 $KE_{max} = hf - W_0$
 $KE_{max} = hc/\lambda - W_0$
 $KE_{max} = q \Delta V$
 $E = \sqrt{(pc)^2 + (mc^2)^2}$
 $hf = \phi + E_{kmax}$
 $KE_{max} = hf - W_0$
 $KE_{max} = hc/\lambda - W_0$
 $KE_{max} = q \Delta V$

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NANOTECHNOLOGY FOR BIOMEDICAL APPLICATIONS AT CFATA

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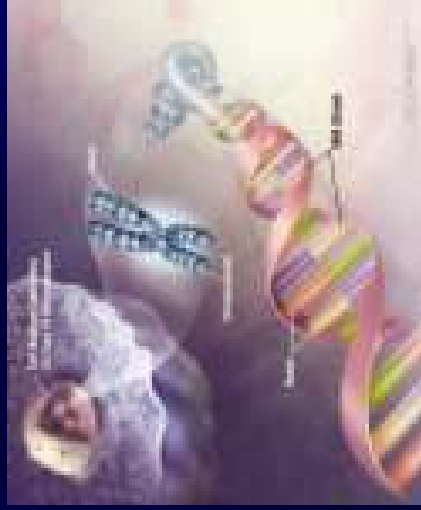
www.fata.unam.mx



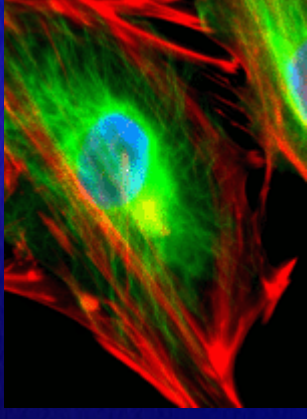
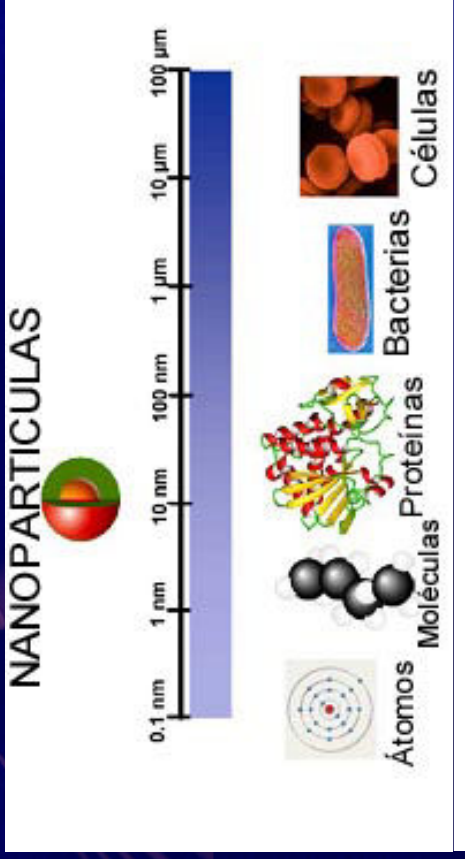
- **Magnetic microparticles → MEMS, magnetic tapes, discs, electronic devices**
- **Magnetic nanoparticles → Quantum Mechanics, Biology, Bioengineering, Biomedical Engineering**

Nanoparticles in Medicine

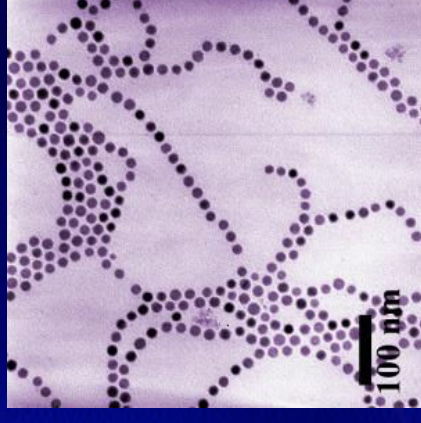
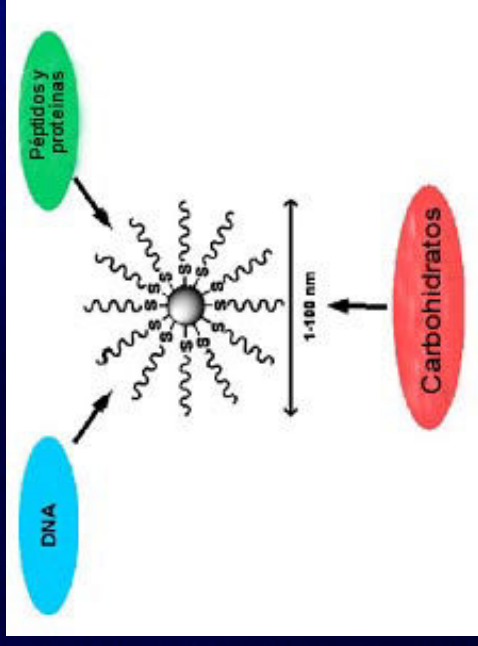
- ✓ Fluorescent labels
- ✓ Drug Delivery
- ✓ Patogens detection
- ✓ Protein Detection
- ✓ DNA-related research
- ✓ Tissue Engineering
- ✓ Cancer treatment
- ✓ Sorting and purification of biomolecules
- ✓ NMR image enhancement
- ✓ Magnetic nanoparticles



OBJECTIVES



Biocompatibility



Functionalization

Peptides

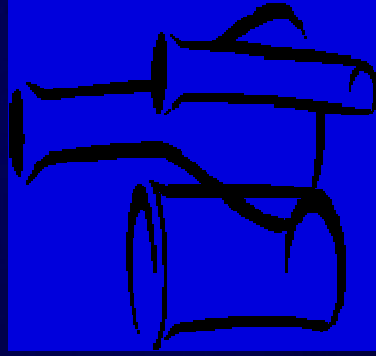
•Protein

•DNA

•Carbohydrates (glyconanoparticles)

Typical approach

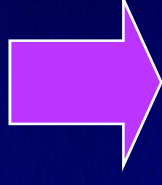
Synthesis → magnetic nanoparticles



Modification → various routes and conditions



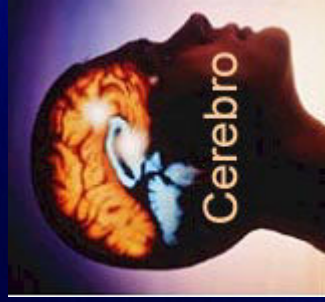
Biocompatibilization → specific brain structures



Biocompatible magnetic nanoparticles



Characterization



BiMEMS



example

Preparation of Ultrafine Fe_3O_4 Particles by Precipitation in the Presence of PVA at High pH

- Magnetite (Fe_3O_4)
- Ferric ions solutions
- PVA aqueous solution

Papell's grinding method

2nm - 50 nm

