Historical milestones of nanobiotechnology

Provide some examples of nano-scaling effects

Carbon-based nanomaterials

Graphene, preparation and applications

Examples of metal-based nanoparticles

What are typical applications of nanoparticle bioconjugates?

Which interactions are important for stability of nanomaterial dispersions?

How can be estimated the molar concentration of nanoparticle dispersion?

Which methods can be used for size characterization of nanoparticles and their bioconjugates?

Which methods can be used for purification of nanoparticles and their bioconjugates?

Describe photolithographic process.

How many types of liquid flow do you know? Which one is predominant in microfluidics and what are the consequences (utilisation)? (Laminar and turbulent flow, principal applications of microfluidics)

What is Lab-on-Chip and Point-of-care? Describe fundamental principles and aims.

What are the approaches to cell sorting?

What are the main approaches to deposition of biomolecules at nanoscale?

Describe main biosensing schemes and principles of nanosensors with electrochemical detection.

Nanopores, what are they used for? Combination of nanopore and field effect transistors?

What is bio-fuel cell? Describe main principles and function.

What does it mean SECM? Describe the principles and measuring options.

Principles of DNA assays, biochips

Name types of scanning probe microscopy techniques and talk briefly about the principle.

What is the effect of AFM tip sharpness on resolution of atomic force microscopy?

Can be microscopy glass used for imaging of individual molecules, such as protein, DNA, etc.?

Describe the procedure for immobilization of protein molecules on the mica surface for AFM microscopy.

Describe the procedure for immobilization of DNA molecules on the mica surface for AFM microscopy.

Make an easy sketch of force-distance curve and describe its basic properties.

Describe two basic modes of AFM microscope operation.

Nanobiotechnologies in biomedicine