# METAL NANOPARTICLES AS PASSIVE AND ACTIVE SUB-WAVELENGTH TOOLS FOR BIOPHOTONICS

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Metal nanoparticles represent an interesting tool for bioanalytics. Due to their small size, attachment to biomolecules does not interfere significantly with specific molecular binding. Therefore particles can be applied as label in affinity assays (e.g., DNA hybridization), using setups with high parallelization and based on their excelling stability and brightness. Beside this rather passive use of nanoparticles, these structures can also be utilized as 'nano antenna' for the conversion of laser light pulses into heat. Using DNA-modified particles sequence-specific bound to DNA, a novel restriction technique is in development that applies this conversion for local DNA destruction.
Metal nanoparticles combine the ability for highly precise positioning (due to specific molecular binding) with the possibility of optical access in a bright-field mode. They exhibit an interesting potential for spanning the gap between the macroscopic technical environment and the molecular scale, thereby enabling a true integration of nanoscale constructs with today's technology.

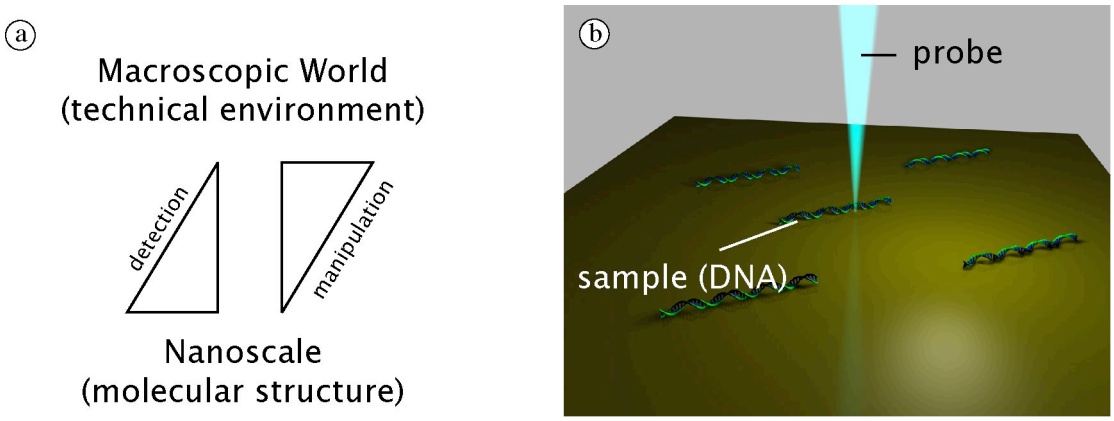


Figure 1: a) A key problem in today's chemical approach to nanotechnology lies in the missing connection between the outside (technical) world and synthesized molecular structures. b) A typical approach to access individual molecular structures is based on small probes, such as laser microbeam or the AFM tip. This probe mediates between both worlds. However, such methods are hampered by missing molecular specificity and the low throughput. Nanoparticle-based approaches are promising solutions to this problem.