# A novel approach for immobilization of DNA in the sub-100 nm range

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Fundamental advances in "bio-nanotechnology" are mainly driven by lithographic techniques used for the Integrated Circuit (IC) industry [1]. However, conventional resist-based approaches cannot be widely used for immobilization of many biological materials due to their chemical incompatibility with typical resists and developers. Therefore, controlling the architecture of immobilized biological species in the micrometer range requires the development of alternative techniques such as contact dip deposition [2], micro contact printing [3], ink-jet printing [4] or dip-pen nanolithography [5]. One common aspect of these techniques is that derivatization of the slides with functional monolayers (using e.g. self-assembling process or silanization) is a crucial intermediate step required to establish a stable biological-inorganic interface.

In this work, the feasibility to anchor directly and covalently double stranded DNA in the sub-100 nm range at patterns written by electron-beam-induced deposition technique is demonstrated on a non-derivatized glass microscope. E-beam induced deposition procedure is used to grow 3D nanostructures in the 100 nm range on a standard glass microscope. In this approach, the e-beam activates residual hydrocarbons from the pump oil to form solid deposits at the irradiated surface. The hydrocarbon molecules adsorbed on the surface react under e-beam to form an amorphous structure of carbon that can be functionalized with DNA. The selectivity of the technique as well as the mechanism of DNA-attachment at e-beam-deposited dots will be discussed.

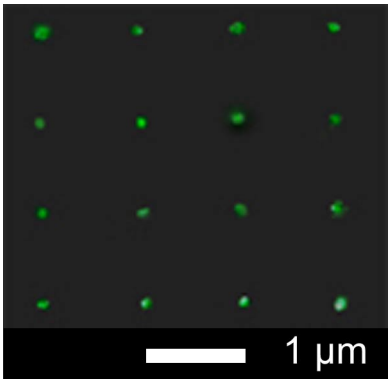


**Fig. 1: Scanning confocal fluorescence image of DNA selectively anchored at e-beam-grown dots. The size of the DNA-spots are between 90 and 110 nm.**

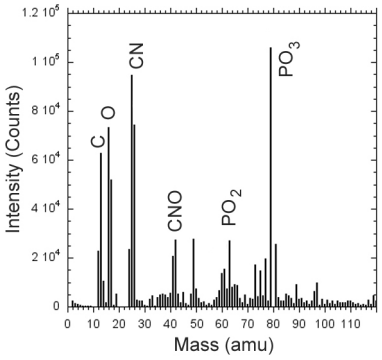


**Fig. 2: Negative ToF-SIMS spectrum obtained from the DNA-modified C-dots.**

## References

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