UNIVERSITY OF TECHNOLOGY
IN THE EUROPEAN CAPITAL OF CULTURE
CHEMNITZ

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MAIN GENERAL ASSEMBLY 2022

DeDNAed: cluster decorated recognition elements on DNA origami for enhanced raman spectroscopic detection methods

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Concept:

- DNA Origami represent a new and simple method for selfassembly of 2D- and 3D-structures
- DNA Origami offer a native resolution of approx. 5,2 nm for the decoration with functional elements (nanoparticles, sensing elements, etc.)
- In this project DNA Origami is used as a nano-breadboard to integrate a biological recognition element in the center of an array of gold nanoparticles for surface enhanced raman spectroscopy

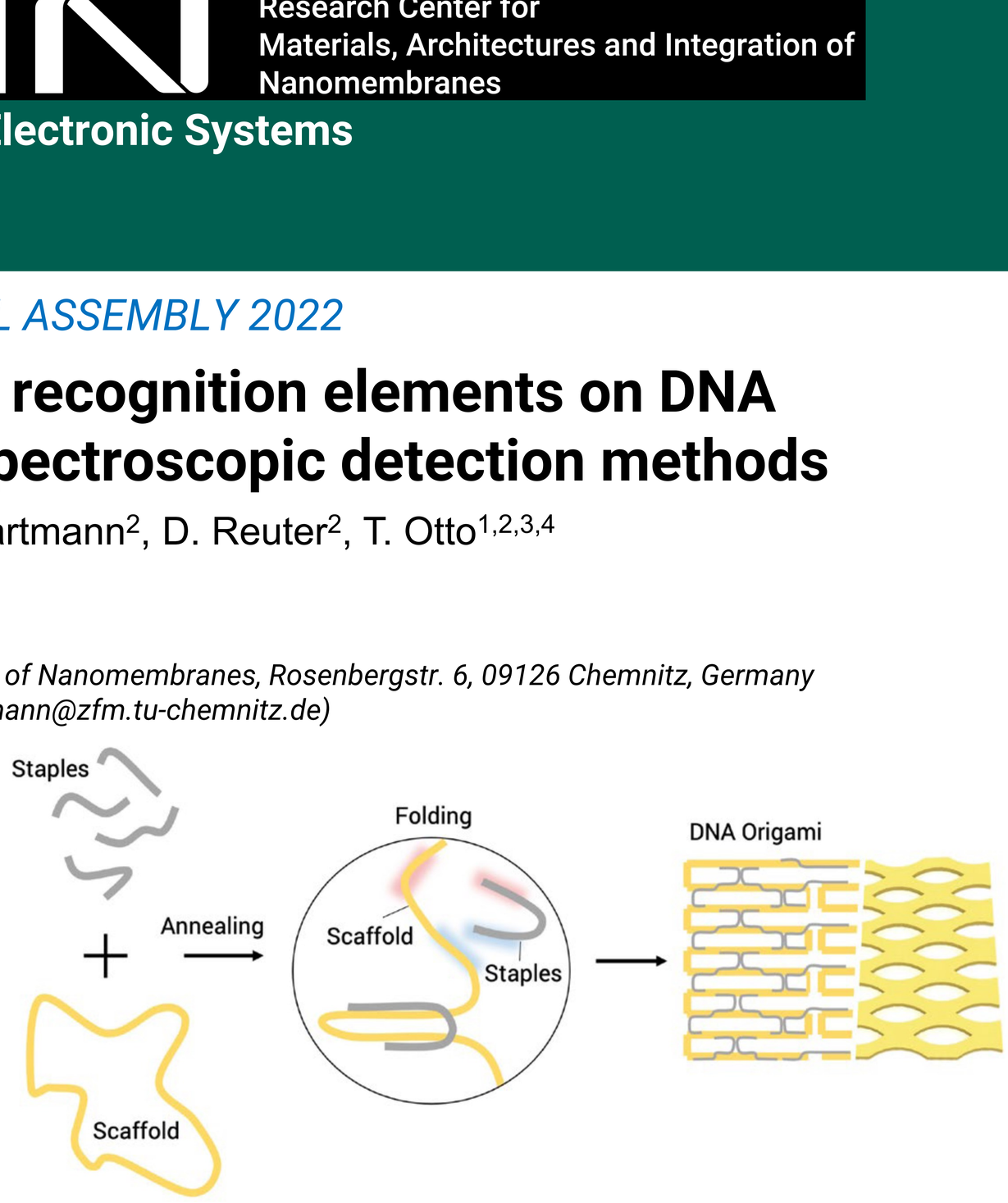

Figure 1: Visualization of the DNA Origami folding mechanism during the self-assembly

Methods:

- Immobilization of DNA Origami for characterization and formation of meta-structures
- bond-resistant layers and bond-attractive structures for the Origami deposition were created using chemical vapor deposition and lithography
- Plasma- and chemical activation of the wafers to favor immobilization at bond-attractive sites

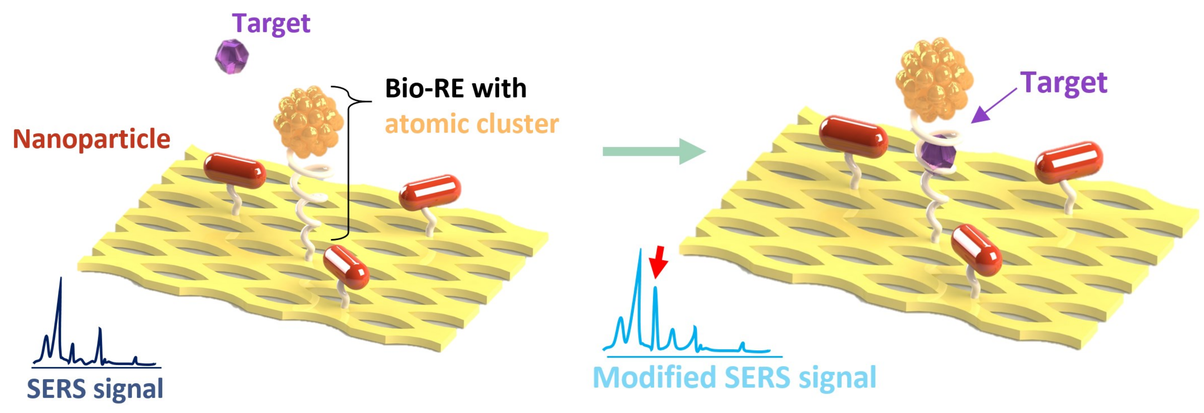

Figure 2: Conceptional picture of the DNA Origami sensor approach

Results:

- Heterogenous self-assembly of the DNA-Origami
- Selective immobilization of DNA Origami on the Wafers
- Comparison of different activation methods and surface modifications for the selective immobilization of DNA Origami

Outlook:

- Functionalization of the DNA-Origami
- Single occupancy of DNA Origami in bond-attractive structures
- SERS measurement of functionalized Origami
- Integration into a microfluidic device for use in a PoC scenario

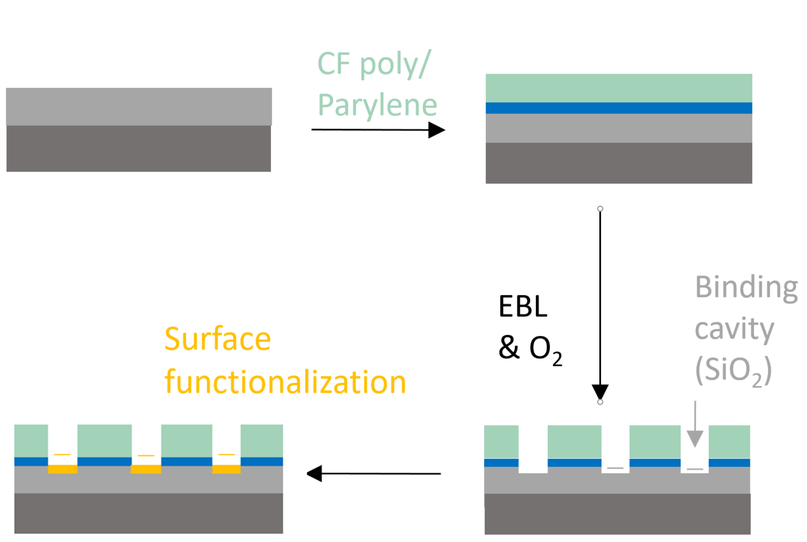

Figure 3: Schematic of the surface functionalization of the SiO_2 Wafers prior to Origami deposition

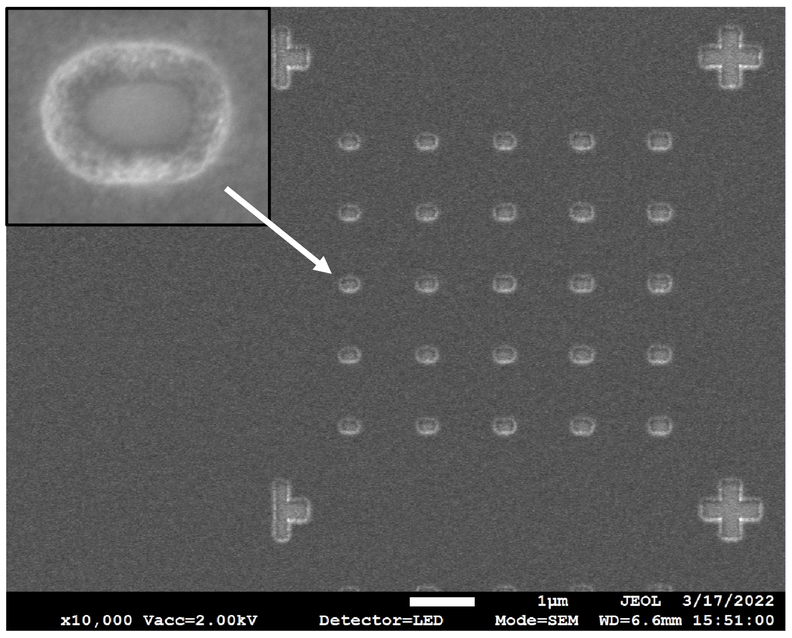

Figure 4: SEM-Image of the Array structure on SiO_2-Wafer

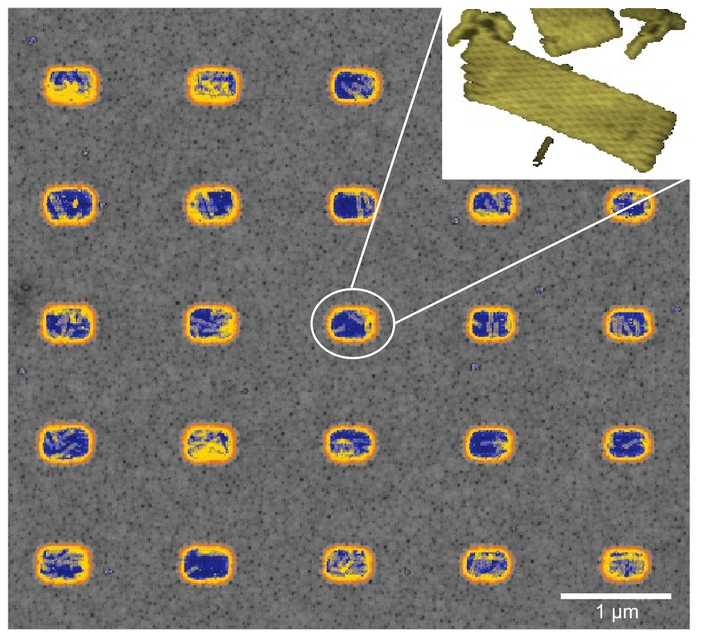

Figure 5: DNA-Origami selectively immobilized in an array on SiO_2-Wafer

Acknowledgement: *DeDNAed has received funding from the European Union's Horizon 2020 Research & Innovation Programme under grant agreement no 964248*