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*Abstract*

# A Tunable and Versatile Anchoring System for Gold-Surfaces †

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The anchoring of hapten/detector molecules is a crucial step in the preparation of gold-based detectors. The established anchoring strategies rely mainly on the thiol–gold interaction (~45 kcal/mol), which is considerably weaker than a regular atomic bond. By synthesizing a cyclic dithiol moiety for the modification of oligonucleotides, 2, 4, 6 or more thiol–gold bonds may be applied for the anchoring of each oligonucleotide. These oligonucleotides may be used as detecting units as such, as a hybridization anchor for more sophisticated (e.g., beacon-like) constructs or they may be terminally modified (amine, biotin, alkine, carboxyl) to bind other (bio)molecules. This method can be used for extended, flat surfaces such as electrodes as well as for nanoparticles, where the introduction of oligonucleotides has the additional benefit of decreasing the tendency of their agglomeration. The anchoring via several dithiol groups increases the stability towards thermal stress, enabling the use of such sensors at elevated temperatures or under PCR conditions and decreases displacement by thiol-bearing molecules which are regularly a constituent of biological samples and it increases the long-term storage stability of modified particles and surfaces. The maximum loading of oligonucleotides is nevertheless only moderately decreased by increasing the number of dithiol units. By varying the number of dithiols, the properties of the surface can thus be tailored to the needs and to the design of the application under consideration.

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