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Quality and Performance of Surface Plasmon Resonance (SPR) Sensor Chips

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The overall performance of a surface plasmon resonance (SPR) system for the measurement of molecular reaction kinetics crititally depends on the perfect fit between the instrument and the SPR sensor chip.
Using inferior glass and inferior gold coating procedures for the sensor will not only degrade instrument performance and lead to incorrect measurement data but perhaps even worse, it will infuriate customers as well.
Our longtime knowledge is based on the lessons from the fabrication and functionalization of thousands of SPR sensor chips. We can guarantee, that the overall performance of a surface plasmon resonance (SPR) system for the measurement of molecular reaction kinetics perfectly fits between the instrument and the SPR sensor chip.

GOLDEN RULES

RULE NO 1 - we definitely recommend to use high end quality glass substrates which are chemically as inert as possible, but at least they must not degrade under the influence of the Piranha cleaning process, i.e. when being cleaned with a mixture of sulphuric acid and hydrogen peroxide.
RULE NO 2 - it is highly preferable to transfer the sensor production into a professional clean room environment to avoid dust, particles and other contamination of the sensor surface from the start. This is the very reason why LSPR AG fabricates all SPR sensor, including funtionalization, in its own class 5/7 clean room environment, exclusively.
RULE NO 3 - the fabrication of the gold layer which is so critical for optimum SPR performance deserves the best tools available. One method to add the nanometer thin gold layer onto the SPR sensor glass substrate is physical vapour deposition (PVD) which allows evaporation of layers with nanometer precision. It goes without saying that the PVD step also must happen in the clean room.
RULE NO 4 - once the gold layer is added onto the SPR sensor glass substrate it must be packed and stored in a clean environment under inert atmosphere. If the gold coated SPR sensor will be chemically functionalized, for example using a Dextran polymer layer, it is vital to continue the fabrication process in the clean room.

THE IMPORTANCE OF PRODUCTION SCALE-UP FOR FUNCTIONALIZED SENSORS

The process of functionalization, i.e. the addition of chemically active layers onto the bare gold sensor, represents a highly critical process step. Here, it is of vital importance to fabricate not only a few functionalized sensors but to functionalize a 'large' number of SPR sensors and to experimentally characterize their quality so that the stability of the process is closely monitored, namely
1. homogeneity of the functional layer over the surface of the sensors (homogeneity)
2. the variation of the functional layer's responses within a production batch (intra-batch uniformity)
3. the variation of the functional layer's responses between production batches (inter-batch uniformity)