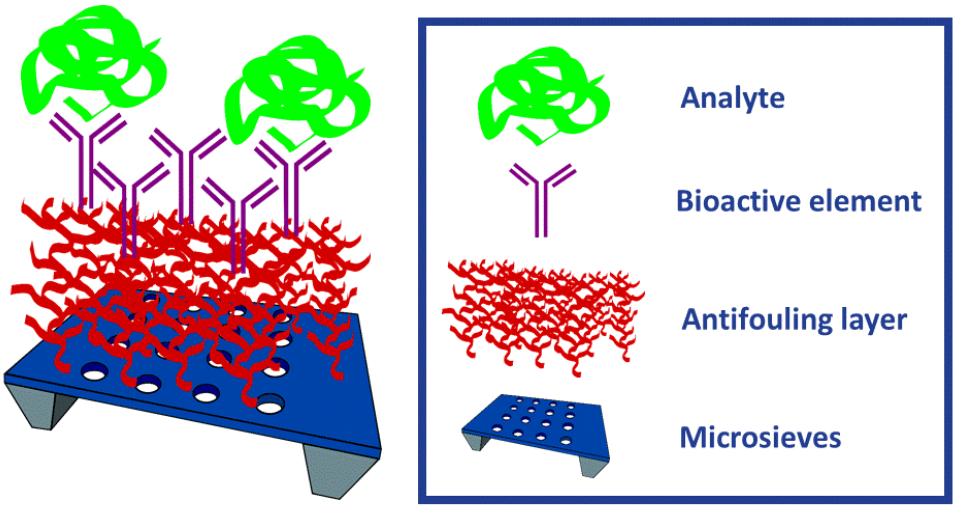
Non-fouling bioaffinity microsieves for integrated sample preparation

A direct-detection platform to recognize food contaminants and food allergens is an essential tool in food industry for food safety. Recently, the concept of a flow-through method for rapid capture and detection of microorganisms and proteins, by using microsieves has been developed. However, non-specific adsorption of proteins on surfaces – fouling, is still a big challenge for selectivity and sensitivity of this platform. Especially, with fluorescence microscopy read-out approach, fouling causes noisy background which may lead to both false positive and negative results.

To reduce the fouling, we design and develop of bioactive non-fouling surfaces. New synthetic path ways for constructing such surfaces that are suitable for industrial application are investigated. In addition, methods to optimize the sensitivity are studied by optimizing the loading and density of the biorecognition elements.



Surface-initiated controlled radical polymerization techniques are used for the creation of non-fouling microsieve surfaces. Bioconjugation of biological active elements on these non-fouling layers gives bioactive surfaces. The functionalized surfaces will be integrated in 3D-printed microfluidic devices for sample preparation and assay readout by smartphones. Their performance in (multiplex) assays for detection of allergens, pathogens and contaminants in food will be evaluated.

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