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Project:	Development of a novel sensor to detect gluten in food
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Introduction

Food allergy has become a worldwide health problem. The adverse immune-mediated reactions to food vary from mild urticaria to potentially lethal anaphylactic shocks. In order to protect the consumer worldwide legislation has been put into place. Among the different allergenic food one of the most widespread is wheat and product thereof. The responsible allergenes in these food are the gluten proteins. The patients with wheat allergy very often suffer from other gluten hypersensitivity - the Coliac disease – an autoimmune disorder which persists for life. The current treatment is a life-long, strict, gluten-free diet. Recently, the relationship between food allergies and infantile autism was explored and gluten-free diet was reported as one of the first effective interventions. EU regulation requires mandatory labeling of the foods containing offending proteins. Besides this, the new Codex Alimentarius of 2008 defines a maximum content of 20 ppm (mg/kg) gluten in naturally gluten-free products and 200 ppm gluten in products rendered gluten-free. Therefore sensitive methods for detection and quantification are needed.

Goal

The goal of this project is to develop a novel biosensor to detect gluten in food. The new mass dependent biosensing device, based on a SiN membrane, will be applied. A device will be used not only for detection of gluten, but also for other proteins targets. Therefore a common immobilisation procedure for the diverse recognition elements on a SiN is needed. Additionally, the project is aiming to find a new recognition element for the gluten, a ssDNA, so called aptamer. The aptamer will be selected using capillary electrophoresis. Subsequently the aptamer will be immobilised of on the sensor surface.

Progress achieved

In this project, we could successfully immobilise on SiN several small model molecules with an amino functionality such as lissamine rhodamine, biotin. The reaction conversion on the surface was evaluated as well as the subsequent characterisation using XPS or fluorescence spectroscopic techniques. As a common platform for the attachment of different biomolecules onto the surface the Cu free click reaction (SPAAC) has been explored.

Further research

The kinetic of the strain promoted azide-alkyne cycloaddition reaction on the surface will be evaluated and a new capillary electrophoresis method will be developed for the selection of specific ssDNA.

Acknowledgement

This work is co-financed by the INTERREG IV A Germany-Netherlands programme through the EU funding from the European Regional Development Fund (ERDF), the Ministry for Economic Affairs, Energy, Building, Housing and Transport of the State of North-Rhine Westphalia and the Dutch Ministry of Economic Affairs and the Province of Gelderland. It is accompanied by the program management Euregio Rhein-Waal.