

Label-free detection of sulfonamide antibiotics in milk with microsystems

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Fast detection of multiple antibiotics in milk at the ppb level is essential during the early phase of the milk chain. We developed a label-free immunosensor based on optical detection, using the wavelength interrogated optical sensing technique (WIOS)¹. The WIOS instrument uses the evanescent field of a waveguide mode to probe changes at the interface of the waveguiding layer. As the small size of antibiotics does not allow a direct detection scheme, a competitive assay format was selected with immobilization of a hapten protein conjugate on the waveguide. Sulfapyridine, an antibiotic belonging to the sulfonamide family, was first tested in the system. The polyclonal antibody produced recognizes most antibiotics of the sulfonamide family far below the MRLs established in milk. Competition of the antibody between an adsorbed sulfonamide hapten and sulfapyridine in solution allowed detecting concentrations of sulfapyridine as low as 10 ppb in buffer, in less than 20 min, including regeneration of the system. Further results on the detection of sulfapyridine in milk will be presented as well. While detection of sulfapyridine validates the sensitivity of the competitive assay, the ultimate goal of this project is the simultaneous detection of multiple antibiotics from different families.

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¹ K. Cottier, M. Wiki, G. Voirin, H. Gao, and R.E. Kunz, "Label-free highly sensitive detection of (small) molecules by wavelength interrogation of integrated optical chips", *Sensors&Actuators B*, vol 91/1-3 pp 241 – 251 (2003).