

# Nanostructured surfaces

## Detection of diclofenac using surface plasmon resonance biosensor

Kıvılcım Çaktü Güler<sup>1</sup>, Emir Alper Türkoğlu<sup>2</sup>, Adil Denizli<sup>3</sup>

<sup>1</sup>Department of Molecular Biology and Genetics, Kilis 7 Aralık University, Kilis, Turkey.

<sup>2</sup>Department of Biology, Ağrı İbrahim Çeçen University, Ağrı, Turkey.

E-mail: [eaturkoglu@yandex.com](mailto:eaturkoglu@yandex.com)

<sup>3</sup>Department of Chemistry, Hacettepe University, Beytepe, Ankara, Turkey.

There is a great concern about pharmaceuticals in water bodies that have vital impacts on health and environment at low concentrations. Diclofenac (DFC) is one of the pharmaceuticals detected in aquatic environments [1,2]. The aim of this study is the preparation of DFC imprinted surface plasmon resonance (SPR) biosensor to detect DFC. SPR biosensor was modified with allyl mercaptane and the orientation of allyl groups was ensured. In the first step, the complex was prepared using DFC as a template and methacrylic acid monomer and prepared complex with functional monomer, HEMA and crosslinker, EGDMA was polymerized on the golden surface of SPR under UV light. Diclofenac imprinted SPR chip was characterized with FTIR-ATR, ellipsometry, atomic force microscopy (AFM) and contact angle measurement. Another biosensor was prepared without using DFC to obtain nonimprinted SPR biosensor and this chip was characterized with ellipsometry, AFM and contact angle measurement. Adsorption studies were performed using acetonitrile/water and desorption studies were performed with methanol/acetic acid (9:1, v:v). DFC sensing ability of DFC imprinted SPR biosensor was investigated from DFC solutions with different concentrations. DFC solutions with different concentrations were used in order to determine the adsorption kinetics. Langmuir adsorption model was found as the most suitable model for DFC imprinted SPR chip. Competitive adsorptions of DFC and carbamazepine were investigated to show the selectivity of DFC imprinted SPR sensor.

1. Dai C., Zhou X., Zhang Y., Liu S., Zhang J. Synthesis by precipitation polymerization of molecularly imprinted polymer for the selective extraction of diclofenac from water samples// J Hazard Mater.-2011.-**198**.-P. 175-181.
2. Letzel M., Metzner G., Letzel T. Exposure assessment of the pharmaceutical diclofenac based on long-term measurements of the aquatic input// Environ.Int.-2009.- **35**.- 363–368.