

(Article: 6)

DEVELOPMENTS OF ELECTRONIC NOSE AND TONGUE FOR DETECTION OF DISEASES

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ABSTRACT

The investigation of human breaths samples with conventional analytical methods like GC/MS have shown a correlations with the occurrence of certain illness. These biomarkers can provide an indication to physiological malfunction and thus help to diagnosis diseases. Acetone is a biomarker for dextrose metabolism and lipolysis. Exhaled isoprene concentrations showed correlations with cholesterol biosynthesis. The concentrations of exhaled sulphur-containing compounds were elevated in liver failure and allograft rejection. Also there are some biomarkers which are enabling for the recognition and diagnosis of complex diseases such as lung or breast cancer. Conventionally, tuberculosis is diagnosed by the combination of symptoms, chest X-ray (CXR), direct staining of mycobacteria in sputum, sputum culture or by nucleic acid amplification techniques. There is a challenge for an ideal diagnostic test for active TB by specific, sensitive, rapid, cost-effective and non-invasive device. Breath analyses with traditional systems are expensive and complicated process. It has been reported that four volatile compounds as methyl phenyl-acetate, methyl nicotinate, methyl p-anisate and o-phenylanisole are present in the breath of tuberculosis patients. We have developed multilayered graphene based electrodes for the detection of biomolecules such as dopamine and uric acid in presence of ascorbic acid by non enzymatic method. Now, we are trying to develop metal oxide based sensors for the detection of biomarkers responsible for early stage Mycobacterium tuberculosis. The electrode materials would be synthesized by simple chemical method. Exhaled breath analysis techniques may be available to diagnose and monitor the diseases in home setting when their sensitivity and specificity are improved in the future.

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