

Development a colorimetric sensor array for detection of explosives in air

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Nowadays international terrorism turns to public concern appearing in various forms, situations and places. New technology must be developed to detect easily a variety of illegal chemicals, substances, drugs and explosives carrying by suspects as well as hidden in mails, luggage and vehicles. The technologies should be portable, rapid, highly sensitive, specific - minimizing false positives - and low cost.

In the framework of the larger research project 'Xsense' we are developing a simple colorimetric sensor array which can be useful in detection and identification of explosives like DNT and TNT in the presence of water vapour and volatile organic compounds (VOCs) in air. The technology relies on an array of dyes immobilized on a solid support. Upon exposure to the analyte in suspicion the dye array changes colour. Each chosen dye reacts chemoselectively with analytes of interest. A change in a colour signature indicates the presence of unknown explosives and VOCs.

We are working on the selection of dyes that undergo colour changes in the presence of explosives, as well as on the development of an immobilisation method for the molecules. Digital imaging of the dye array before and after exposure to the analytes creates a colour difference map which creates a unique fingerprint for each explosive. Such sensing technology can be used to screen for relevant explosives in a complex background as well as to distinguish mixtures of VOCs distributed in gas phase. This sensor array is inexpensive, and can potentially be produced as single use disposables.