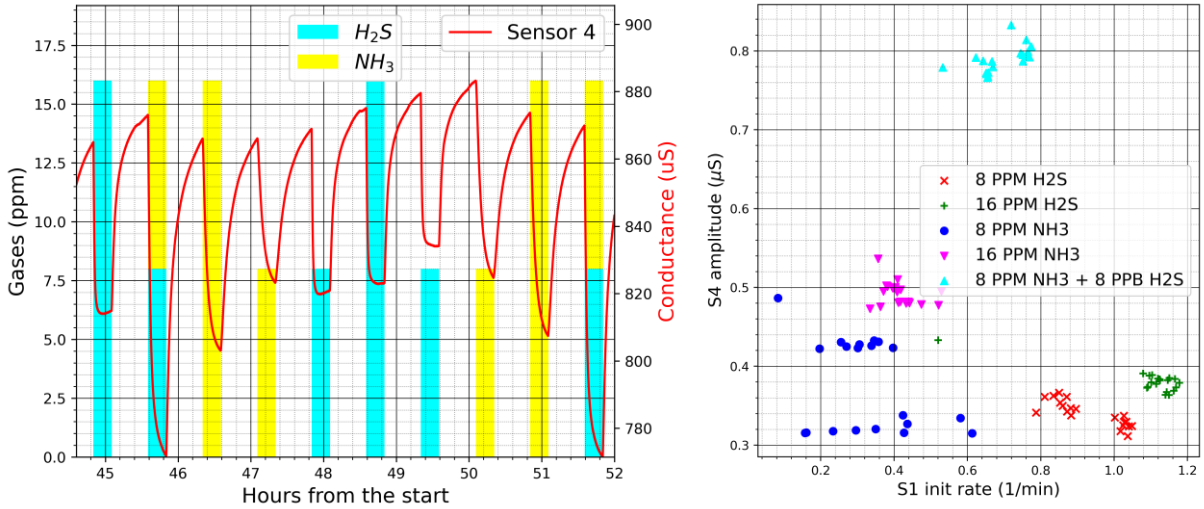
DETECTING NH3 AND H2S IN A MIXTURE IN 0-16 PPM RANGE WITH GRAPHENE-BASED GAS SENSORS

Martin Lind, Valter Kiisk, Margus Kodu, Tea Avarmaa, Tauno Kahro, Raivo Jaaniso

Institute of Physics, University of Tartu, W. Ostwaldi 1, 50411 Tartu, Estonia

E-mail of the presenting author: martin.lind@ut.ee

Sensitive, miniature and low-power gas sensing elements are urgently needed for a portable electronic nose. Detecting NH_3 and H_2S is relevant for chemical industry and agriculture[1]. Hereby we prepared CVD graphene-based chemiresistive sensors on SiO_2 / Si substrates. Graphene was functionalized with a variety of ultrathin oxide coatings by pulsed laser deposition. Over the course of several days, the heated sensors were exposed to sequentially generated cycles of 8 ppm NH_3, 8 ppm H_2S, 16 ppm NH_3, 16 ppm H_2S and 8 ppm NH_3 + 8 ppm H_2S (left figure). Humidity was either kept constant (at 50%) or changed cyclically in sequence 20%, 40%, 60%. Various response features (amplitude, response rate, recovery rate) were considered for machine learning. The most promising features proved to be sensor amplitudes. Using artificial neural network as the classification algorithm for machine learning, we succeeded at distinguishing NH_3 and H_2S in the relevant concentration range (right figure).



References:

1. C. Baitong et al, 2020, *Frontiers in Environmental Science*, 8, 613646. DOI: 10.3389/fenvs.2020.613646

Euroopa Liit
Euroopa
Regionaalarengu Fond

Eesti
tuleviku heaks