DNPH-based Formaldehyde Nano- Detector and Absorption Plate

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Indoor air quality has been an increasing concern due to abundant pollutant emission sources. We investigated on the removal of one of the most toxic and abundant air pollutants – carbonyl compounds. We also investigated the feasibility to make an electronic formaldehyde detector using nano- material. The specific reaction of 2,4 dinitrophenylhydrazine (DNPH) and carbonyl is utilized for the removal and detection. Formaldehyde, acetaldehyde and acetone were under our investigation. In chamber experiments we found out the use of plasticizer, medium with pH 1.82 or below would optimize the heterogeneous phase absorption. 3 generations of absorption plates were made and compared. In the middle stage, we designed and built a 2-layered air exhauster together with a color indicator to show the saturation of absorption plates. The device further enhances the absorption efficiency, that acetone was detected to be removed in 40 minutes with speeded up ventilation. In the later stage, we tried to conduct field sampling in vehicles in getting more information on the absorption capacity, so that we investigated on an electronic formaldehyde detector. The nitro-groups on DNPH were reacted with the carboxylic group of amino acid, and be coated on reduced grapheme oxide (RGO). 0.8 MΩ of resistance was measured when RGO was coated on microscopic slide, 125 kΩ of resistance was measured when it was coated on filter paper. DNPH coated cellulose-agar absorption plate in-line with the use of an air exhauster was found effective in removing carbonyls from air. Further research should be conducted to explore possibility of extensive application.