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PHOTOTHERMAL DESORPTION (PTD) OF BUCKYPAPERS (BPS) FOR VOLATILE ORGANIC COMPOUND (VOC) SAMPLING AND ANALYSIS

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This study was aimed to find an efficient sorbent for use with our novel desorption technique, photothermal desorption (PTD) which thermally desorbs an analyte by applying a pulse of light. Two types of single-walled carbon nanotubes (SWNTs), arc discharge (AD) and high-pressure carbon monoxide (HiPco), were used to fabricate buckypapers (BPs) and they were examined as a potential sorbent for PTD. Upon fabrication (AD BP and HiPco BP), heat treatment was administered to improve adsorption properties. Adsorption properties, including Brunauer-Emmett-Teller (BET) surface area and pore size, of the heat-treated BPs were characterized and then tested for PTD. Toluene was used as a representative volatile organic compound (VOC) and a photographic grade xenon flash lamp was used for PTD. As a result, both types of BPs showed a large surface area (933 – 970 m²/g) and small mean pore diameter (5.6 – 5.9 nm). The difference in the recovery rate between AD and HiPco BPs was statistically significant ($p < .0007 - .0256$) AD BP having the higher recovery rate (0.016 – 0.431 %) at all energy levels examined (1.84 – 7.37 J), indicating that AD BP is a viable sorbent for VOC sampling and analysis using PTD.

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