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BOOK OF ABSTRACTS

GRAPHENE-BASED HYBRID SORBENTS IN SAMPLE PREPARATION: 4. DEVELOPMENT AND APPLICATIONS IN ENVIRONMENTAL AND FOOD ANALYSIS

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Graphene-based hybrid sorbents are promising materials for use in microextraction techniques during sample preparation. Their surface modifications can improve selectivity, stability, and compatibility with different matrices. In this study, we summarize selected applications developed by the CROMA group, which utilize graphene-based hybrid sorbents in various microextraction techniques, for a range of analytes and complex matrices. Applications involving graphene oxide-based hybrid sorbents, such as [VHIm]Br, [VIm+C4SO3−], and thiol-functionalized GO (GO-SH), were conducted to extract triazine herbicides from environmental waters and grape juice using stir bar sorptive extraction (SBSE). Graphene oxide–silica functionalized with 1-vinyl-3-hexylimidazolium octane sulfonate (GO@Sil-[VHIm]+OS−) was employed to extract tebuconazole from orange juice by dispersive solid-phase microextraction (DSPME). Multiclass pesticides in Spanish wines were extracted using silica–graphene grafted with ionic liquids through microextraction by packed sorbent (MEPS). Using silica-supported ionic liquids (ILz/Si@GO), selected pesticides were extracted from coffee samples, also with MEPS. Pesticides from sugarcane crops and derived foods were extracted with octadecylsilane endcapped phases using disposable pipette extraction (DPX). Chitosan-based biosorbents (SiGO@CS) were utilized to extract triazoles from fruits using DPX, as well as pesticides (thiamethoxam, atrazine) and antibiotics (ceftiofur, sulfonamide) from food matrices such as corn, tomato, and milk using MEPS. β-Lactam antibiotics in water samples were determined using graphene oxide supported on silica (GO@SiO2) combined with MEPS. In addition, isoflavones from human urine samples were extracted using a β-CD–graphene oxide composite supported on aminopropyl silica (Si@GO@βCD) coupled to a needle-sleeve extraction device for automated SPME. Overall, the applied modifications, including imidazolium ionic liquids, chitosan-based biosorbents, functionalized silica supports, and endcapped phases, as will be shown in the poster, demonstrate the versatility of graphene-based materials. They also highlight the potential of the phases developed by the group to expand sample preparation capabilities.

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