

Imparting molecular specificity to surface-modified polymeric probes for the selective capture of plant metabolites.

Metabolites released from litter leachates and root exudates help the plants to adapt to a wide range of habitats by facilitating resource foraging and by promoting plant-organismal interactions. Most of these functions are facilitated by small molecules that possess high biological activity. Hence a precise understanding of the molecular identity of these compounds is imperative to gain a mechanistic view of the processes at the plant-soil interface. Due to their high biological activity, most of these small molecules are produced and exuded at infinitesimally low concentrations. However, soils are awash with plant metabolites that are less biologically active- carbohydrates and amino acid exuded from roots, and macromolecules that are produced during the litter decomposition. Hence biologically active plant compounds are often crowded-out during the traditional analytical approaches, which hampers our understanding about the identity and dynamicity of these compounds. We previously demonstrated the application of *hyper-crosslinked* poly(styrene-co-vinylbenzyl chloride-co-divinylbenzene) probes for the *in-situ* capture of plant metabolites of low polarity from soil matrix, with a high spatial resolution. Here we further impart specificity to this copolymer matrix by using molecular-template imprinting approach for the selective capture of less abundant plant metabolites from a crowded soil/litter leachate. Specificity was imparted by developing polymeric probes through *in-situ* polymerization of matrix containing templates of plant metabolites. The specificity of these molecularly-imprinted-polymeric (MIP) matrix to capture flavonoids from soil and litter leachates were investigated. Compared to the hyper-crosslinked probes, the MIP exhibited lower surface area. However the MIP exhibited >100 times higher selectivity in retaining the proxies of the template molecules from the leachate compared to the hyper-crosslinked probes. The extraction efficiency of the adsorbed compound varied from 72-105%, resulting in detection limits of <5 ng/ml for the representative flavonoid compounds. Template leaching during sampling was addressed by using labeled molecules for imprinting. The MIP exhibited a higher LoD for glycosylated flavonoids compared to their respective aglycones. MIP were further modified to increase their aqueous-compatibility, so as to directly sample the soil solution. Utilization of MIP in conveniently usable formats will be discussed. Future work is focused on developing MIP coating on to the glass/stainless-steel rods for the *in-situ* sampling of soil solution in the field.