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## Novel monolithic capillary columns for multimodal (reversed-phase, hydrophilic interactions, chiral and achiral) capillary electrochromatography

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In this talk, the previously developed poly(carboxyethyl acrylate-coethylene glycol dimethacrylate) precursor monolith (referred to as carboxy monolith) was further exploited in the preparation of stationary phases for capillary electrochromatography (CEC) bearing ligands that can accommodate chiral separations as well as achiral separation via reversed-phase chromatography (RPC) and hydrophilic interactions chromatography (HILIC). The carboxy monolith precursor was subjected to post polymerization functionalization with either (S)-(-)-1-(2-naphthyl) ethylamine (NEA) or (-) norepinephrine (NEN) chiral selectors at room temperature in the presence of N, N'-dicyclohexylcarbodiimide (DCC) in chloroform in the case of NEA or 1-ethyl-3[3-dimethylaminopropyl] carbodiimide (EDAC) in water in the case of NEN. The DCC, which is an organic soluble carbodiimide, and the EDAC a water soluble carbodiimide, permit the linkage for the amine functionality of the ligands NEA or NEN to the carboxy group of the monolithic surface forming a stable amide linkage. The NEA column thus obtained allowed not only the enantiomeric separations in the RPC mode via its chiral site but also the separation of nonpolar species via its achiral functionality offering both hydrophobic and  $\pi$ - $\pi$  interactions for aromatic compounds such toluene derivatives and polyaromatic hydrocarbons. On the other hand, the NEN ligand allowed the enantiomeric separations of racemic mixtures in the HILIC mode as well as the separations of relatively polar compounds such as nucleosides and nucleotides via its polar functionalities. The dual sites of the NEA and NEN present convenient columns for the separations of a wide range of slightly polar and nonpolar chiral and achiral solutes in the RPC and HILIC modes.

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