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First Report on the Trophic Transfer and Priority List of Liquid Crystal Monomers in the Pearl River Estuary

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Liquid crystal monomers (LCMs) are emerging organic pollutants due to their potential persistence, biotoxicity, and bioaccumulation. This study first characterized the levels and compositions of 19 LCMs in organisms in the Pearl River Estuary (PRE), estimated their bioaccumulation and trophic transfer potential, and identified priority contaminants. LCMs were generally accumulated in organisms from sediment ($BSAF_{19LCMs}$>1), and the LCMs concentrations in all organisms ranged from 32.35-1367 ng/g lipid weight. The main LCMs in organisms were biphenyls and analogues (BAs) (76.6%), followed by cyanobiphenyls and analogues (CBAs) (15.1%), and the least were fluorinated biphenyls and analogues (FBAs) (11.2%). The most abundant LCM monomers of BAs, FBAs, and CBAs in LCMs in organisms were PVB (15.1%), EDPBB (10.1%), and 3OCB (5.1%), respectively. The niche studies indicated the PRE food web was composed of terrestrial and marine food chains. Most LCMs exhibited biodilution (TMF_{17LCMs}=0.17-0.81) in terrestrial and marine food chains, except for EDPBB and BPCHB (TMF=1.35, 1.26). The hydrophobicity, position of fluorine substitution of LCMs, and biological habits may be important factors affecting the trophic transfer of LCMs. BPCHB, PPB, and EDPBB were characterized as priority contaminants. This study first reports the trophic transfer processes and mechanisms of LCMs, and the biomonitoring in PRE.