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STRAIN-INDUCED CHIRALITY INVERSION BY DISTINCTLY DIFFERENT HELIX PATHWAY IN CO²⁺-TRIGGERED SUPRAMOLECULAR PEPTIDE POLYMERS

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We report a distinctly different dynamic helix inversion pathway of self-assembled terpyridine-based ligands composed of different numbers of peptide moieties with Co²⁺ and its amplification of strain-induced chirality from an achiral terpyridine moiety. The helical chirality of the metal centers, coordinated by terpyridine ligands is controlled by strain induced chirality with complex ligands to Co²⁺ ratios. We also show that the distinct helical inversion mechanism is significantly dependent on the number of peptides attached to ligands. The helical inversion pathway of the self-assembled ligand (R-1 and S-1) complexes composed of one alanine analogue (R- or S-2-amino-1-propyl moiety) and one long saturated alkyl chain relies on two steps of chirality with different complex geometries, first from strain-induced chirality originating from an octahedral structure to octahedral structure with different helical direction and then on to helical chirality in a square pyramidal structure. In contrast, the helix inversion of the self-assembled R-2 and S-2 complexes containing an alanine analogue and two glycine moieties with Co²⁺ was followed by one step to form two distinct coexisting complex geometries having the same helical direction. In particular, the circular dichroism (CD) intensities of the self-assembled R-1 and R-2 complexes with Co²⁺ were 900–1500-fold amplified, compared to those of free R-1 and R-2. The Gibbs free energy of the self-assembled complexes with different geometries were also calculated by temperature-dependent CD observation; the square pyramidal structure of the self-assembled R-1 complex with Co²⁺ was more stable than the self-assembled R-2 complex with Co²⁺.

Biography

Ka Young Kim received her MS Degree in 2015 from the Gyeongsang National University in Chemistry. She is currently a PhD candidate in Chemistry at Gyeongsang National University. Her research interest is in supramolecular structures and their application.

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