52. Däitsch Konferenz iwwer Flëssegkristallen
52. Deutsche Arbeitstagung Flüssigkristalle
52nd German Liquid Crystal Conference
University of Luxembourg, Belval Campus
Esch-Uelzecht (LU), 08–10 April 2026
GLCC2026

Salt Complexation Drives Liquid Crystalline Self-Assembly in Crown Ether–Amino Acid Hybrids

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Crown ether–amino acid hybrids represent a promising class of amphiphilic molecules combining ion recognition with self-assembly capabilities.[1] Despite extensive studies on their binding properties, the influence of inorganic salt complexation on their liquid crystalline behaviour remains underexplored. Here, [18]-crown-6 derivatives based on L-dihydroxyphenylalanine DOPA(n) and tetrahydroisoquinoline THIQ(n) were synthesized to investigate the effects of alkyl chain length and salt type on mesophase formation.[2] Salt complexation induces liquid crystalline order, with a transition from smectic A to columnar hexagonal phases as anion size and chain length increase. Structural analyses and electron density mapping revealed assembly into charged columnar assemblies with tunable ion-conducting channels. These findings establish salt complexation as a key strategy to control self-assembly and ion transport in crown ether–amino acid hybrids, advancing their potential in responsive soft materials and ion-conductive applications.

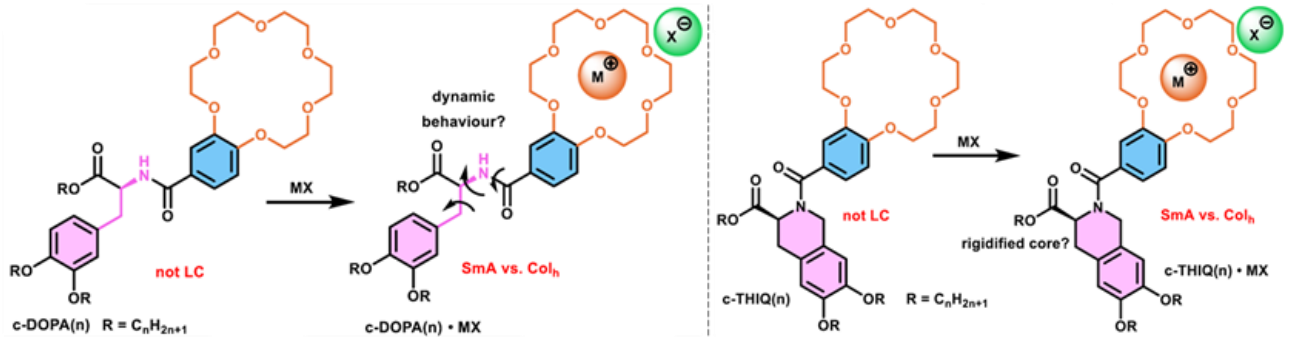

Figure 1: Mesophase induction by complexation with different salts MX in crown ether-amino acid hybrids.

References

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Acknowledgments

Generous financial support by the Deutsche Forschungsgemeinschaft (DFG grant # LA 907/21-1; HU 850/13-1; SCHO 470/26-1, INST 41/897-1 FUGG for 700 MHz NMR, INST 41/1136-1 FUGG for Orbitrap LC-MS), the Carl-Schneider Stiftung Aalen (shared instrumentation grant) and the Ministerium für Wissenschaft, Forschung und Kunst des Landes Baden-Württemberg are gratefully acknowledged.