# Photoresponsiveness of lyotropic liquid crystals via precipitation-dissolution of an arylazopyrazole derivative

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Research on incorporating photoresponsive molecules into lyotropic liquid crystals (LLCs) for the optical control of their phase states is attracting attention due to their potential applications in drug delivery systems and other fields. Photostimulation offers high spatiotemporal flexibility, enabling versatile control of the liquid crystal phase through irradiation area and duration. However, conventional photoresponsive LLC systems face two major challenges. First, many photoresponsive molecules exhibit low thermal stability of one isomer, hindering precise control of the liquid crystal phase. Second, these systems often require a high concentration of photoresponsive molecules, which necessitates prolonged light irradiation. For rapid optical conversion, it is crucial to develop a system that functions with the addition of a small amount of dopant.

To address these issues, this study focused on an arylazopyrazole (AAP) derivative, an azobenzene analogue with high thermal stability of its *cis* -isomer. [1] Specifically, AAP-C10, which possesses an alkoxy group with a carbon chain length of 10, was synthesized. By doping a small amount of AAP-C10 into LLCs, photoresponsive liquid crystals were prepared, and their photoresponsiveness was evaluated. Upon UV irradiation of an AAP-C10-doped LLC, a shift in the SAXS pattern, indicating a change in the liquid crystal structure, was observed. Furthermore, when this UV-irradiated LLC was left in the dark at room temperature, almost no thermal back-isomerization from the *cis* - to the *trans* -isomer of AAP-C10 was observed, demonstrating the high thermal stability of these systems.

**Keywords:**
arylazopyrazole, lyotropic liquid crystals, photoresponsiveness

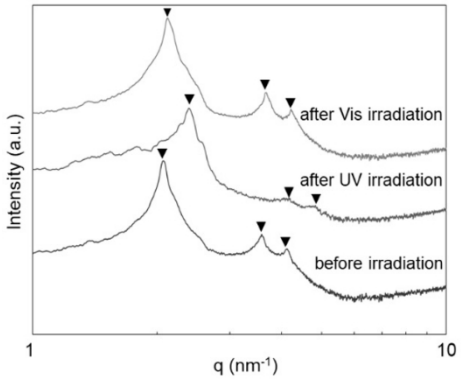


*Fig.1. SAXS patterns of the hexagonal LLC doped with 1 wt% AAP-C10 before and after light irradiation.*

**References:**

[1] Z.-Y. Zhang et al., *Chem. Eur. J.* , **2019** , *25* , 13402-13410.