

Dichroic Photoinitiators: Unlocking a New Dimension in Liquid Crystal Polymer Design

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Since their emergence in the 1980s, reactive mesogens (RMs) have developed into a versatile class of soft-matter materials with applications ranging from advanced optics and photonics to adaptive surfaces and soft robotics. Their unique ability to preserve molecular order during photopolymerization has enabled the creation of liquid crystal networks (LCNs) with programmable optical and mechanical properties. Initially adopted in display technologies, LCNs have since expanded into a broad range of responsive material systems.

Conventionally, LCNs are prepared by in-situ photopolymerization of liquid crystal monomers using isotropic free-radical photoinitiators. In this lecture, a new class of **dichroic photoinitiators** will be introduced, providing an additional and powerful means to control molecular order during network formation. Owing to their rod-like molecular structure, these initiators align with the liquid crystal director, while their electronic transition dipole moment is oriented predominantly along the molecular long axis. As a result, the efficiency of photoinitiation becomes dependent on the polarization direction of the incident UV light relative to the local director orientation.

This polarization-dependent initiation process enables spatial modulation of the polymerization rate and introduces a new degree of freedom for directing network formation and material properties. Several examples will be presented to illustrate the versatility of dichroic photoinitiators and their potential for the fabrication of complex optical and mechanically responsive liquid crystal materials.

Biography:



Dirk J. Broer is polymer chemist specialized in molecular order, structuring and self-organization. In 1973, he joined Philips Research, Eindhoven, Netherlands where he developed the liquid crystal network technology which led to his PhD degree at Groningen University in 1990. From 2003 to 2010 he was senior research fellow and vice president at Philips Research. He was appointed in 1996 as part-time professor at Eindhoven University of Technology and in 2010 as fulltime professor to chair the Department Functional Organic Materials and Devices expanding further his research on adaptive materials. He is member of the Royal Dutch Academy of Sciences.