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Title:	Microrheology to probe smectic clusters in bent-core nematic liquid crystals
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Keywords:	Microrheology Bent-core liquid crystals Nematic phase
Issue Date:	2020
Publisher:	Royal Society of Chemistry
Citation:	Soft Matter, 16(32), pp.7556-7561.
Abstract:	Many bent-core nematic liquid crystals exhibit unusual physical properties due to the presence of smectic clusters, known as "cybotactic" clusters, in the nematic phase. Here, we investigate the effect of these clusters on the complex shear modulus ($G^*(\omega)$) of two asymmetric bent-core liquid crystals using a microrheological technique. The compound with a shorter hydrocarbon chain (8OCH ₃) exhibits only a nematic (N) phase whereas the compound with a longer chain (16OCH ₃) exhibits both nematic (N) and smectic-A (SmA) phases. The rheological results are correlated with the measurements of curvature elastic constants. Our results show that the directional shear modulus of 16OCH ₃ , just above the SmA to N phase transition temperature, is strikingly different than that of 8OCH ₃ , owing to the smectic clusters. An approximate size of the clusters is estimated using a simple model. Therefore, microrheological studies on bent-core nematic liquid crystals are very useful in extracting information about underlying smectic clusters.
Description:	Only IISERM authors are available in the record.
URI:	https://pubs.rsc.org/en/content/articlelanding/2020/SM/D0SM00796J#divAbstract (https://pubs.rsc.org/en/content/articlelanding/2020/SM/D0SM00796J#divAbstract) http://hdl.handle.net/123456789/3183 (http://hdl.handle.net/123456789/3183)
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