Photo controlled surfaces in rheology of liquid crystals

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Photoalignment technology was primary elaborated for practical application in display industry [1]. Nevertheless, it can be also effectively used in basic researches of liquid crystals via a possibility to create substrates with the given surface orientation and the controllable anchoring strength.

In this report we consider the possible experiments concerning linear and non linear phenomena in shear flows of liquid crystals confined by photo controlled surfaces. In particular, we will demonstrate the possibility of rotation of mono domain samples of liquid crystals without usage of magnetic or electric field. It provides to avoid the existence of near surface LC layers with the distorted orientational structure arising via application of magnetic and electric field. Experimental confirmation of such possibility will be demonstrated by the results of shear viscosity measurements obtained at investigation of a specific decay flow of liquid crystals [2].

We will also consider the possible application of photo controlled surfaces for investigations of hydrodynamic instabilities in liquid crystals. A control of the anchoring strength in this case makes possibleto realize weak anchoring conditions and to check experimentally the corresponding theoretical predictions [3].

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