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# INFLUENCE OF METHYLTRIOXYSILANE PRECURSOR AND SOLVENT CONCENTRATION ON ORMOSIL DISPERSED LIQUID CRYSTAL

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ODLCs (Ormosil Dispersed Liquid Crystal), also known as GDLCs (Gel-glass Dispersed Liquid Crystals), were first reported in 1991 [1]. Conventional method for preparation of ODLCs consists of several steps: preparation of sol from different silicon and metal alkoxides, then mixing the sol and LC material, and finally result in the formation of LC microdroplets. The latter occurs when evaporation of solvents and polymerization reactions cause phase separation between LC and matrix materials. Resulting electro-optical material consists of LC microdroplets encapsulated in inorganic or organically modified silica glass matrix [1,2] and changes its optical properties under the influence of electric field.

In current work the influence of methyltriethoxysilane (Me-TEOS) concentration on operating voltage and optical transmittance of ODLC-films is investigated. The films were prepared using tetraethoxysilane (TEOS) and Me-TEOS in molar ratios ranging from 1:5 to 5:1, respectively. Possibility to obtain ODLCs without using solvents in the synthesis is demonstrated for the first time. Although some alcohol (approximately 3–4 moles per 1 mole of alkoxide) is created by chemical reactions during ODLC formation, it is shown that generally avoiding solvents in the process results in wider LC droplet size distribution, increased thickness of the films, and larger variation of the transmittance. It is also shown that lower operating voltages can be achieved than reported earlier while also using significantly lower concentrations of Me-TEOS. In addition, a novel approach to avoid cracking of the ODLC films by using polyvinylpyrrolidone (PVP) is introduced.

Electro-optical characterization was carried out on ODLC devices that were prepared by sandwiching the ODLC layer, covered in dielectric resin, in between two ITO-electrodes. Operating voltage was found not to depend directly on the Me-TEOS/TEOS ratio, but rather on the diameter distribution of LC droplets. Observed operational voltage reduction of the films prepared using low concentrations of Me-TEOS and solvent-free synthesis is an important step toward simplifying the procedure of ODLC preparation, while improving the electro-optical characteristics of the material.

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## References

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2. M. Zayat, D. Levy, Chem.Mater. **15** (2003) 2122-2128.