Liquid Crystal Photoalignment Materials Based on Reversible Intermolecular Bonds

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Photoalignment is a non-contact surface treatment that induces surface anisotropy for orientation of liquid crystals, allowing reduction of alignment defects formation upon fabrication of alignment layer. Due to unique ability to provide smooth anisotropic surface the photoalignment materials are perspective for application in novel liquid crystal based devices with low light leakage. However the common problems of known photoalignment materials are low anchoring energy and poor stability towards environmental impacts, i.e. moisture and heat.

We developed new type of photoalignment materials based on reversible intermolecular bonds (RIB) [1], remarkable for its high value of azimuthal anchoring energy above $5x10^{-4}$ J/m^2 and intrinsic thermo-stability of the photoinduced molecular anisotropy up to 200°C and over. The innovative concept explains the correlation between the molecular structure and its photoalignment properties [2], which enabled flexible modification of properties of the photoalignment materials [3]. Our records of achievements are the water-compatible RIB photoalignment materials: a) water-proof materials washable with de-ionized water [4] and b) water-soluble materials for deposition from aqueous solutions [5].

The application of RIB photoalignment materials for passive liquid crystal refractive interfaces is perspective for future liquid crystal photonic devices.

References

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