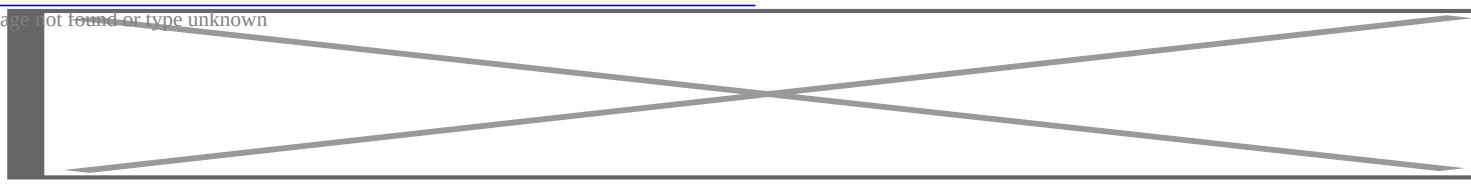
Nano Machines for Ultimate Control of False Memories

Description

Nano Machines for Ultimate Control of False Memories
Image not found or type unknown



Further References

Liu, Q., Liu, Y., Lv, J., Chen, E., & Yu, Y.. (2019). Photocontrolled Liquid Transportation in Microtubes by Manipulating Mesogen Orientations in Liquid Crystal Polymers. Advanced Intelligent Systems

Plain numerical DOI: 10.1002/aisy.201900060
DOI URL
directSciHub download

Show/hide publication abstract

“Tubular microactuators (tmas) fabricated by photodeformable liquid crystal polymers (lcps) pave a significant way for smart microfluidic applications with contactless, spatial, and precise manipulation of liquids. to realize liquid transportation in these tmas, lcps should have excellent photodeformation property and suitable mechanical properties. herein, linear liquid crystal polymers (llcps) with different mesogen orientations are used to prepare tmas to study their liquid transportation behaviors. the mesogen orientation in each llcp is formed spontaneously and varies with the spacer length, leading to different deformations of llcp films. it is found that only llcps with mesogens oriented out-of-plane realize self-support of the tmas, whereas the tmas with mesogens oriented in-plane are so weak that they collapse in the radial direction, indicating the importance of mesogen orientation in fabricating three-dimensional structures. upon attenuated 470?nm light irradiation, the tmas deform to an asymmetric conical structure, leading to the motion of liquid slug toward the narrow side. the liquid motion is accelerated in the tma with longer spacer, showing the control of liquid speed by the mesogen orientation. these photocontrolled tmas are expected to be applied in biological applications, such as whole blood analysis and flow cytometry, for precise liquid manipulation.”
Tian, K., Yang, S., Niu, J., & Wang, H.. (2021). Enhanced Thermal Conductivity and Mechanical Toughness of the Epoxy Resin by Incorporation of Mesogens without Nanofillers. IEEE Access

Plain numerical DOI: 10.1109/ACCESS.2021.3058612
DOI URL
directSciHub download

Show/hide publication abstract

“Epoxy resin is widely used due to its electrical insulation performances, but low elongation defects at the break, low thermal conductivity, and high brittleness limit its application scenarios. in this paper, the mesogen is utilized to improve the thermal conductivity and mechanical toughness of the traditional epoxy resin. both the mechanical performances, including the impact strength, tensile strength, the bending strength, and the thermal behaviors, including the thermal conductivity, are investigated. results show that with the biphenyl liquid crystal epoxy resin(blcer) content of 10%, the impacting strength, tensile strength, and bending strength are increased by 71%, 21%, and 11%, respectively. the thermal conductivity of the composites increases to 2.26 times that of pure epoxy resin. both the enhanced mechanical and thermal performance of the epoxy resin by the mesogen incorporation are further investigated. it is indicated that the mesogen in the biphenyl liquid crystal epoxy resin significantly improve both the mechanical toughness and thermal conductivity of the epoxy resin by the formation of the micro-crack behavior and the thermal conductive networks, respectively. with the aids of the mesogen, the improved variety of properties in epoxy resin without reducing its original performance is attractive in the industry application with great demand in the balance of the comprehensive performances.”
Wang, L., Zhang, Y., Zhan, C., You, Y., Zhang, H., Ma, J., … Wei, R.. (2019). Synthesis and photoinduced anisotropy of polymers containing nunchaku-like unit with an azobenzene and a mesogen. Polymers

Plain numerical DOI: 10.3390/polym11040600
DOI URL
directSciHub download

Show/hide publication abstract

“A series of polymers containing nunchaku-like unit with an azo chromophore and a mesogen group was successfully prepared and photoinduced anisotropy of the obtained polymers was minutely investigated. firstly, monomers containing nunchaku-like unit with an azo chromophore and a mesogen group linked by flexible group were synthesized. the structure of the monomers was confirmed via nmr cosy spectra. subsequently, the obtained monomers were polymerized into corresponding polymers through raft polymerization. the prepared polymer samples were characterized through nmr, ftir, gel permeation chromatography (gpc), and uv-vis testing while the thermal properties of the samples were investigated through differential scanning calorimeter (dsc) and thermogravimetric analysis (tga) measurements. the photoinduced isomerization of the polymers, which was researched in situ via measuring uv-vis spectra of the polymer solutions and spin-coated films under irradiation with 450 nm light or putting in darkness, demonstrated the rapid trans-cis-trans isomerization of the polymers. when irradiated with a linearly polarized light, significant photoinduced birefringence and dichroism were observed, suggesting photoinduced isomerization of azobenzene can drive orientation of mesogen in the system. this study blazes a way to design the optical materials with light-controllable birefringence and dichroism.”
Liu, C., Ding, W., Liu, Y., Zhao, H., & Cheng, X.. (2020). Self-assembled star-shaped aza-BODIPY mesogen affords white-light emission. New Journal of Chemistry

Plain numerical DOI: 10.1039/c9nj04755g
DOI URL

directSciHub download

Show/hide publication abstract

“A novel multifunctional star-shaped aza-bodipy mesogen was synthesized by a click reaction. this star-shaped aza-bodipy mesogen undergoes self-assembly into a hexagonal columnar phase in its bulk state and spherical gels in organic solvents. based on the investigation of the absorption and emission spectra and surface morphologies, j-aggregates are observed in their liquid crystalline (lc), gel and solid states, while h-aggregates are observed in n-hexane solution. additionally, this star-shaped aza-bodipy mesogen acts as a chemosensor toward cn- ions via a nucleophilic addition reaction, and the corresponding addition product can yield white light emission (wle) upon doping with blue dye. this star-shaped aza-bodipy mesogen is represented as the first example of an aza-bodipy derivative with lc, organogel and white light emission properties.”
Kawano, S. I., Kato, M., Soumiya, S., Nakaya, M., Onoe, J., & Tanaka, K.. (2018). Columnar Liquid Crystals from a Giant Macrocycle Mesogen. Angewandte Chemie – International Edition

Plain numerical DOI: 10.1002/anie.201709542
DOI URL
directSciHub download

Show/hide publication abstract

“Columnar liquid crystals composed of a giant macrocyclic mesogen were prepared. the giant macrocyclic mesogen has a square hollow with a 2.5 nm diagonal, which was bounded by diindolo[3,2-b:2?,3?-h]carbazole (diindolocarbazole) moieties as the edges and bis(salicylidene)-o-phenylenediamine (salphen) moieties as the corners. the shape and size of the macrocycle were directly observed by scanning tunneling microscopy (stm). each side of the bright square in the stm image corresponds to a diindolocarbazole moiety, and the length of the sides was consistent with the result of the single crystal analysis of diindolocarbazole. finally, we successfully obtained a giant macrocycle with long and branched side chains, which exhibited a rectangular columnar lc phase over a wide temperature range. to the best of our knowledge, it contained the largest discrete inner space of any thermotropic columnar liquid crystal composed of macrocyclic mesogens.”
He, R., Wen, P., Ye, Y., Oh, E., Kang, S. W., Lee, S. H., & Lee, M. H.. (2020). Bulk-mediated in-situ homogeneous photoalignment induced by reactive mesogen containing diphenylacetylene moiety. Liquid Crystals

Plain numerical DOI: 10.1080/02678292.2019.1680759
DOI URL
directSciHub download

Show/hide publication abstract

“We designed and synthesised a reactive mesogen containing diphenylacetylene moiety in the mesogenic core and two polymerisable acrylate groups at both ends. by irradiating linearly polarised uv light on the conventional host lc mixture containing a small amount of the synthesised reactive mesogen in a sandwiched cell without an alignment layer, we demonstrated an in-situ photo-induced

homogeneous alignment of liquid crystals without a pre-treated alignment layer, which was achieved by an irreversible polarisation-selective [2 + 2] photodimerization of diphenylacetylene moiety with linearly polarised uv irradiation at above the isotropic temperature of lc mixture. the resulting homogeneous alignment showed a superior initial dark state, negligible pretilt angle and excellent stabilities. furthermore, the in-plane switching (ips) lc cell prepared by this method exhibited a better dark state and electro-optic performance compared to that with conventional-rubbed polyimide alignment layer. the single photoirradiation process automatically resulted in a perfect alignment matching of optical axes between the top and bottom substrates in the lc cell, giving rise to an excellent dark state overcoming an intrinsic misalignment issue and complex fabrication process. the proposed in-situ alignment method is a promising candidate for cost-effective, green-manufacturing, and high-quality alignment technique in the manufacturing of high-resolution liquid crystal displays."
Kwok, M. H., Bohannon, C. A., Crooks, J. L., Li, R., Zhao, B., & Zhu, L.. (2020). Grafting density-induced smectic A to hexagonal columnar transition in mesogen-free isotactic liquid crystalline polyethers with n-dodecylsulfonyl side groups. Giant

Plain numerical DOI: 10.1016/j.giant.2020.100003
DOI URL
directSciHub download

Show/hide publication abstract

"Highly dipolar mesogen-free liquid crystalline polymers are excellent candidates for achieving large spontaneous polarization under relatively low electric fields for advanced electrical and optical applications. in this report, the effect of grafting density of n-dodecylsulfonyl side chains on the mesogen-free liquid crystalline self-assembly of comb-like isotactic poly(oxypropylene) was studied. when the grafting density was 80–100%, a stable 21 helical chain conformation was induced by the strong dipole-dipole interactions among the sulfonyl groups in the side chains. consequently, a smectic a self-assembly was induced. when the grafting density decreased to 60–80%, a poor and possibly imbalanced 21 helical chain conformation was formed due to the frequent absence of the n-dodecylsulfonyl side chains along the main chain. as a result, a hexagonal columnar self-assembly was realized. this study demonstrated that a delicate interplay between the molecular defects and dipole-dipole interactions can lead to different self-assembly structures."
Pan, H., Xiao, A., Zhang, W., Luo, L., Shen, Z., & Fan, X.. (2019). Hierarchical nanostructures of a liquid crystalline block copolymer with a hydrogen-bonded calamitic mesogen. Polymer

Plain numerical DOI: 10.1016/j.polymer.2019.121835
DOI URL
directSciHub download

Show/hide publication abstract

"With a pyridine derivative containing a calamitic mesogen 4-((6-((4'-((4-hexylphenyl)ethynyl)-[1,1?-biphenyl]-4-yl)oxy)hexyl)oxy)pyridine (hebc6) used as the hydrogen-bonding acceptor and polydimethylsiloxane-b-poly(2,5-bis(4-carboxy phenyl)styrene) (pdms-b-pm3h) as the hydrogen-bonding donor, a series of supramolecular liquid crystalline block copolymers (slcbcps) were prepared through hydrogen bonding. in the supramolecular block, the calamitic mesogen was decoupled from the motion of pm3h chains by using a flexible spacer. different microphase-separated nanostructures

and liquid crystalline (lc) structures were obtained by varying the degree of polymerization of the pm3h block and the molar ratio of hebc6 to pdms-b-pm3h. the slcbcps can self-assemble into hexagonally packed cylinders (hex), lamellae (lam), and inverted hex. smectic a phase and parallel packing of the calamitic mesogens were also observed on a smaller length scale, and these two ordered structures are synergistic and promotional. therefore, hierarchically ordered structures can be obtained from these slcbcps."
Wang, M., Bao, W. W., Chang, W. Y., Chen, X. M., Lin, B. P., Yang, H., & Chen, E. Q.. (2019). Poly[(side-on mesogen)-Alt-(end-on mesogen)]: A compromised molecular arrangement. Macromolecules

Plain numerical DOI: 10.1021/acs.macromol.9b00607
DOI URL
directSciHub download

Show/hide publication abstract

"In recent years, sequence-controlled side-chain liquid crystal polymers (sclcps) have gained extensive interest because mesogenic units with different lengths and distributions can form various ordered sequences, which further endow lcp materials with diverse functions. in this manuscript, a side-chain side-on maleimide-containing monomer 2,5-bis-(4-butoxy-benzoyloxy)-benzoic acid 6-(2,5-dioxo-2,5-dihydro-pyrrol-1-yl)-hexyl ester (y1801) and a side-chain end-on styrene-containing monomer 4?-[6-(4-vinyl-phenoxy)-hexyloxy]-biphenyl-4-carbonitrile (y1802) are combined in one single macromolecular chain and orderly polymerized in an alternative sequence to form an alternating copolymer poly(y1801-alt-y1802). the chemical structure and alternating sequence of poly(y1801-alt-y1802) are confirmed by gpc and nmr techniques. the combination of dsc, pom, and waxs data indicates that, although the side-on homopolymer py1801 and the end-on homopolymer py1802 both exhibit the nematic phase, their alternating copolymer poly(y1801-alt-y1802) shows an interdigitated smectic a phase, a compromised molecular arrangement instead. in addition, a strong fluorescence emission of poly(y1801-alt-y1802) is observed, which might provide this novel alternating-structured liquid crystal polymer with potential applications in luminescent materials and devices. ©"
Keerthiga, R., Kaliyappan, T., & Kannan, P.. (2019). Studies on twist bent core zinc (II) methacrylate supramolecular columnar hexagonal phase mesogen derived from azobenzene moiety and its photo luminescent behaviours. Inorganic Chemistry Communications

Plain numerical DOI: 10.1016/j.inoche.2018.11.002
DOI URL
directSciHub download

Show/hide publication abstract

"A class of zn(ii) polymethacrylate mesogen was tailored with photoluminescent property as well as high thermal stability by wrapping the zn(ii) metal in polymethacrylate mesogenic core. the versatile thermal stability of the mesophase was accounted by long chain terminal alkoxy groups and jacketed zn(ii) metal core. the extended stable mesophase with rise in temperature was achieved by excellent coordination between the supramolecular ligand with that of metal core. the schiff base was prepared by treating (1-bromo (4-dodecyloxy azobenzene)) with octadecyl amine in ethanolic medium. the schiff base obtained was polymerised with methacrylic acid (ma) in presence of aibn as free radical initiator.

the supramolecular mesogenic ligand (pma-l) was further complexed with zn(ii) acetate in 1:1 m ratio. the zn(ii) supramolecular mesogen was extensively characterized by 1h nmr, 13c nmr and ft-ir. the mesomorphic behaviour was studied by xrd diffractogram, dsc, pom. the zn(ii) supramolecular exhibits columnar phase transition due the molecular stacking in disc shape. the disc shape mesophase of the zn(ii) supramolecular mesogen was achieved by sandwich pattern of metal core between two organic ligands arrangement. the photo physical character of the zn(ii)polymeric mesogen was studied by absorption and fluorescence spectral method."
He, R., Oh, E., Ye, Y., Wen, P., Jeong, K. U., Lee, S. H., … Lee, M. H.. (2019). Fabrication of highly efficient coatable polarizer from tolane-based smectic reactive mesogen. Polymer

Plain numerical DOI: 10.1016/j.polymer.2019.05.032
DOI URL
directSciHub download

Show/hide publication abstract

"This work is aimed to fabricate ultra-thin coatable polarizers on a single substrate based on 'host-guest' effect between highly ordered smectic reactive mesogen (rm) and dichroic dye. we designed and synthesized a new tolane-based rm with a highly ordered smectic a phase at room temperature. polymerizable 'host-guest' mixture was formulated from the host rm, dichroic dye and additives, then spin-coated on a single substrate having an alignment layer. subsequent in-situ photopolymerization by uv irradiation successfully resulted in a coatable polarizer with good polarizing properties. the fabricated coatable polarizer showed a dichroic ratio (dr) of 16.4 and a degree of polarization (dop) of 99.3% with the thickness of 4 ?m. the resulting coatable polarizer possessed a considerable solvent resistance, good thermal stability and robust mechanical properties. moreover, we prepared a tn-mode lc cell by using the prepared coatable polarizers inside the cell (in-cell), in which the coatable polarizers acted as a polarizer and an alignment layer, simultaneously. the resulting tn cell with in-cell polarizers exhibited a decent electro-optical behavior. we believe that the coatable polarizer proposed in this study possesses practical application potential in ultra-thin lcds or flexible oleds."
Lyu, X. L., Pan, H. B., Shen, Z. H., & Fan, X. H.. (2018). Self-assembly and Properties of Block Copolymers Containing Mesogen-Jacketed Liquid Crystalline Polymers as Rod Blocks. Chinese Journal of Polymer Science (English Edition)

Plain numerical DOI: 10.1007/s10118-018-2115-x
DOI URL
directSciHub download

Show/hide publication abstract

"Mesogen-jacketed liquid crystalline polymer (mjlcp) has attracted great attention because of its rigid conformation, facile synthesis, and structural controllability. in this feature article, the self-assembly of mjlcp-based block copolymers (bcps) is briefly reviewed, especially the nanostructures of rod-coil diblock copolymers (dibcps), rod-rod dibcps, and triblock copolymers. in addition, the properties of the self-assembled bcps are also summarized, including their applications as liquid crystalline thermoplastic elastomers and solid polymer electrolytes. the article also discusses the major challenges and future directions in the study of mjlcp-based bcps."

Lee, M., Bae, J. W., Kim, A., Yun, H. S., & Song, K.. (2015). Alignments of reactive mesogen using rubbed glass substrates. Polymer (Korea)

Plain numerical DOI: 10.7317/pk.2015.39.1.174
DOI URL
directSciHub download

Show/hide publication abstract

“Alignments of photo-reactive mesogen were induced using bare glass substrates without a polymer alignment layer. it was found by using polarized ftir spectroscopy, polarized microscopy, and birefringence measurement experiments that the reactive mesogen could be aligned along the rubbing direction although the glass substrate without an alignment layer was used. the induction mechanism of the rubbed bare glass is ascribed to that polymers from rubbing clothes are coated on the glass substrate along the rubbing direction and lead the alignment of liquid crystals through intermolecular interactions.”

Kamarudin, M. A., Khan, A. A., Williams, C., Rughoobur, G., Said, S. M., Nosheen, S., … Wilkinson, T. D.. (2016). Self-assembled liquid crystalline nanotemplates and their incorporation in dye-sensitised solar cells. Electrochimica Acta

Plain numerical DOI: 10.1016/j.electacta.2016.11.021
DOI URL
directSciHub download

Show/hide publication abstract

“Liquid junction dye-sensitised solar cells (dsscs) suffer from solvent evaporation and leakage which limit their large-scale production. here, we have prepared dssc using a simple and cheap fabrication process with improved photovoltaic parameters and stability. a binary mixture of smectic a (sma) and nematic liquid crystal (nlc) was used to provide a self-assembled template for a polymerisable reactive mesogen lc. the layered structure of sma combined with a low viscosity nlc forms a polygonal structure that provides an ordered and continuous template for reactive mesogens. once the reactive mesogen is polymerised under uv light, the sma:nlc mixture is washed away, resulting in a polymer network template containing nanochannels. we demonstrate the incorporation of these templates into dsscs and find that dsscs containing these nanochannels show improved open-circuit voltage (voc) (0.705 v) and short-circuit current (jsc) (13.25 ma cm?2) compared to that of the liquid electrolyte (voc = 0.694 v and jsc = 10.46 ma cm?2). the highest obtained power conversion efficiency with sm-pe was 5.94% which is higher than that of the reference solar cell (5.51%). these can be attributed to the improved ionic conductivity and ionic diffusion of sm-pe where the presence of the nanochannels aided the ionic conduction in the polymer electrolyte. in addition, it is hypothesized that the light scattering effect of the polymerised reactive mesogen also contributed to the improved performance of the photovoltaic devices. this finding is important because it is known fact that when a polymer is added to liquid electrolyte, the ionic conductivity will decrease although the stability is improved.”

Yeom, Y. S., Cho, K. Y., Seo, H. Y., Lee, J. S., Im, D. H., Nam, C. Y., & Yoon, H. G.. (2020). Unprecedentedly high thermal conductivity of carbon/epoxy composites derived from parameter optimization studies. Composites Science and Technology

Plain numerical DOI: 10.1016/j.compscitech.2019.107915
DOI URL
directSciHub download

Show/hide publication abstract

“Efficient removal of heat accumulation from electronic devices has been considered an important issue because it is prone to induce reduced lifetime, heat shock, ignition, and malfunction during their operation. to that end, optimized epoxy composites, which are fabricated by dispersing a mesogen-containing polymer compatibilizer (bpib)-applied multi-layered graphene nanoplate (mgnp) filler into a mesogen-containing epoxy (dgebp) matrix (bpib-mgnp/epoxy), are designed toward high thermal conductivity at the low filler loading content. various effects on its thermal conductivity, including size, thickness, and dispersion of fillers along with the crystalline property of epoxy, are systematically investigated by comparing with their intermediate counterpart materials. the extended micromechanics model, which was modified using a power law from its initial one, was employed to address the filler size effects on its thermal conductivity as well as an exponential increase of thermal conductivity with increasing filler loading content. thickness effects of carbon fillers are examined by comparing gnp/epoxy composites with single-layered graphene filler-based epoxy composites. the effects of dispersion properties of the fillers in the epoxy composites are also investigated using the theory prediction plot based on the extended micromechanics model. the comparison between experimental and theoretical prediction led us to study crystalline properties of the bpib-mgnp/epoxy composites because it was unexpected and beyond the theoretical traces. an ashby plot is prepared to evaluate the state of our results by comparing them with the reported state-of-the-art composite performances.”
Palani, T., Saravanan, C., & Kannan, P.. (2011). Pendant triazole ring assisted mesogen containing side chain liquid crystalline polymethacrylates: Synthesis and characterization. Journal of Chemical Sciences

Plain numerical DOI: 10.1007/s12039-011-0061-z
DOI URL
directSciHub download

Show/hide publication abstract

“Two series of click chemistry assisted alkoxymethyl-1h-[1,2,3]-triazol-1-yl containing sidechain liquid-crystalline polymethacrylates were synthesized by free radical polymerization technique. mesogen was linked to backbone through various spacer units. monomers and polymers were characterized by ft-ir, 1h and 13c-nmr spectral techniques. thermal stability of polymers was confirmed by thermogravimetric analysis. mesomorphic property and phase transition temperature of polymers were analysed by differential scanning calorimetry and polarized optical microscopy. phase transition temperature and mesomorphic property of polymers with respect to insertion of polar alkoxy group on terminal triazole ring and spacer length between backbone and mesogen were investigated. polymers exhibited grainy like textures under polarized optical microscopy. spacer length between mesogen and backbone alters

phase transition temperature of the polymers. © indian academy of sciences."
Lugger, J. A. M., Mulder, D. J., Bhattacharjee, S., & Sijbesma, R. P.. (2018). Homeotropic Self-Alignment of Discotic Liquid Crystals for Nanoporous Polymer Films. ACS Nano

Plain numerical DOI: 10.1021/acsnano.8b01822
DOI URL
directSciHub download

Show/hide publication abstract

"Nanostructured polymer films with continuous, membrane-spanning pores from polymerizable hexagonal columnar discotic liquid crystals (lcs) were fabricated. a robust alignment method was developed to obtain homeotropic alignment of columns between glass surfaces by adding a small amount of a tri(ethylene glycol) modified analogue of the mesogen as a dopant that preferentially wets glass. the homeotropic lc alignment was fixated via a photoinitiated free radical copolymerization of a high-temperature tolerant trisallyl mesogen with a divinyl ester. removal of the hydrogen-bonded template from the aligned columns afforded a nanoporous network with pores of nearly 1 nm in diameter perpendicular to the surface, and without noticeable collapse of the nanopores. the effect of pore orientation was demonstrated by an adsorption experiment in which homeotropic film showed a threefold increase in the initial uptake rate of methylene blue compared to planarly aligned films."
Baliyan, V. K., Lee, B., & Song, J. K.. (2020). Quantum Dot Arrays Fabricated Using in Situ Photopolymerization of a Reactive Mesogen and Dielectrophoresis. ACS Applied Materials and Interfaces

Plain numerical DOI: 10.1021/acsami.0c10915
DOI URL
directSciHub download

Show/hide publication abstract

"Dielectrophoresis (dep) is an excellent tool for manipulating small particles within a liquid or gas medium. however, when the size of the particles is too small, such as with quantum dots (qds), it is difficult to manipulate the particles using dep because the dielectrophoretic force (fdep) depends on the volume of the particles and is therefore too weak to achieve particle migration. herein, we demonstrate a novel method for controlling nanoscale qd particles using dep by introducing photopolymerized reactive mesogen (rm) bead vehicles. the size of an rm bead is well-controlled by the rm concentration in the medium, and when the size is approximately 0.2 ?m or larger, the rm beads can be arbitrarily manipulated using dep under moderate electric fields. interestingly, during photopolymerization, qd particles are easily absorbed by polymerized rm beads and most of the qds are embedded within the rm beads. hence, we can fabricate periodic qd arrays by manipulating the rm beads containing such dots. in addition, we can fabricate multicolor qd arrays by repeating the processes using different qd particles. the shape of a dep-assisted qd-rm network pattern can be precisely predicted by calculating the gradient of the square of the electric field (?e2) and the corresponding fdep. this new technology may be useful for the fabrication of optical devices, displays, photonic crystal devices, and bioapplications."
Ndaya, D., Bosire, R., Vaidya, S., & Kasi, R. M.. (2020). Molecular engineering of stimuli-responsive, functional, side-chain liquid crystalline copolymers: Synthesis, properties and applications

. Polymer Chemistry

Plain numerical DOI: 10.1039/d0py00749h
DOI URL
directSciHub download

Show/hide publication abstract

“This review describes the recent progress made in designing stimuli-responsive, functional, side-chain, end-on mesogen attached liquid crystalline polymers (lcps). developments in synthetic methodologies including controlled and living techniques provide an easy access to well-defined liquid crystalline polymers. for example, the synthesis of linear liquid crystalline block copolymers (lcbcps), block copolymers with a linear, coil-coil, non-lc block and an end-on mesogen attached lc block, provides a route to polymers with morphology and properties akin to conventional block copolymers. however, synthesis of topologically branched lcbcps with a branched coil-coil non-liquid lc block and an end-on mesogen attached lc block is used to manipulate the phase behavior, morphology and alignment kinetics of the resultant polymer. furthermore, synthesis of branched liquid crystalline random copolymers wherein the branched coil-coil non lc unit and end-on mesogen lc unit are statistically distributed results in never-before-seen helical and curved interfaces with new and enhanced properties. finally, synthetic strategies to incorporate organic dye molecules into a variety of liquid crystalline polymer frameworks produce new optically active and adaptive soft materials. in the outlook section, the need for topologically diverse synthetic and naturally derived liquid crystalline polymer architectures along with processing tools and field directed assemblies to produce functional materials and their applications are discussed. this journal is”
Ishinabe, T., Isa, H., Shibata, Y., & Fujikake, H.. (2021). Flexible polymer network liquid crystals using imprinted spacers bonded by UV-curable reactive mesogen for smart window applications. Journal of Information Display

Plain numerical DOI: 10.1080/15980316.2021.1960648
DOI URL
directSciHub download

Show/hide publication abstract

“We propose junction-type, vertically aligned polymer network liquid crystals using plastic substrates for flexible smart windows, in which the spacers are formed with the imprinting method and are bonded to the substrate surface by uv-curable reactive mesogen (rm). we clarified that the optical property can be improved by suppressing the aggregation of rms around the spacers through thinning of the coating of the rm and the simultaneous improvement of the wettability of the parallel alignment film. we achieved excellent haze properties of 3.0% with voltage off and 92.7% with voltage on, and high curvature performance with a small curvature radius of 9.0 mm.”
Yu, E. S., Kim, S. U., Suh, J. H., Kim, J., Na, J. H., & Lee, S. D.. (2016). The domain mixing effect on the electro-optical properties of liquid crystals using polyimide doped with reactive mesogen. Journal of Information Display

Plain numerical DOI: 10.1080/15980316.2016.1208631
DOI URL

directSciHub download

Show/hide publication abstract

“This paper investigates the enhancement of the electro-optic (eo) properties of liquid crystal (lc) devices by the domain mixing effect of vertical-alignment polyimide (pi) doped with reactive mesogen (rm). the mixture of pi and rm on a glass substrate was exposed to ultraviolet light and was thermally annealed to produce circular microdomains of the lc polymer (lcp) in the pi background. due to the appearance of such lcp microdomains depending on the rm doping concentration, the eo properties such as the threshold voltage and the response times were significantly improved in a vertically aligned configuration of the lcs.”
Chen, X. F., Shen, Z., Wan, X. H., Fan, X. H., Chen, E. Q., Ma, Y., & Zhou, Q. F.. (2010). Mesogen-jacketed liquid crystalline polymers. Chemical Society Reviews

Plain numerical DOI: 10.1039/b814540g
DOI URL
directSciHub download

Show/hide publication abstract

“This critical review covers the recent progress in the research of mesogen-jacketed liquid crystalline polymers (mjlcps), special side-on side-chain liquid crystalline polymers with very short spacers or without spacers. mjlcps can self-organize into supramolecular columnar phases with the polymer chains aligned parallel to one another or smectic phases with the backbones embedded in the smectic layers. the semi-rigid rod-like mjlcp with a tunable rod shape in both length and diameter provides an excellent building block in designing novel rod–coil liquid crystalline block copolymers which can self-assemble into hierarchical supramolecular nanostructures depending on the competition between liquid crystal formation and microphase separation (229 references). © 2010 the royal society of chemistry.”
Mitsui, S., Nagano, S., Hara, M., & Seki, T.. (2017). SRG inscription in supramolecular liquid crystalline polymer film: Replacement of Mesogens. Crystals

Plain numerical DOI: 10.3390/cryst7020052
DOI URL
directSciHub download

Show/hide publication abstract

“The photoinduced surface relief formation via mass transfer upon irradiation with patterned light has long been a subject of extensive investigation. in azobenzene-containing liquid crystalline materials, uv light irradiation that generates the cis isomer leads to the liquid crystal to isotropic photochemical transition. due to this phase change, efficiency of the mass transfer to generate a surface relief grating (srg) becomes markedly greater. we have previously indicated that azobenzene-colored srg-inscribed film can be bleached by removing a hydrogen-bonded azobenzene mesogen. however, this process largely reduces the height feature of the srg corrugation. herein, we propose an extended procedure where a colorless mesogen is filled successively after the removal of the azobenzene side chain. the

process involves four stages: (i) srg inscription in a hydrogen-bonded supramolecular azobenzene material; (ii) crosslinking (insolubilization) of the srg film; (iii) removal of azobenzene mesogen by rinsing with a solvent, and (iv) stuffing the hollow film with a different mesogen. although the final stuffing stage was insufficient at the present stage, this work demonstrates the possibility and validity of the strategy of mesogen replacement."
Lehmann, M., Hecht, M., Herbst, S., Cui, K., & Würthner, F.. (2020). Unfolding multi-stranded perylene bisimide LC columns-a mesogen design for efficient nanoscale multilayer self-assembly. Chemical Communications

Plain numerical DOI: 10.1039/d0cc06458k
DOI URL
directSciHub download

Show/hide publication abstract

"A mesogen tethered, twofold bay-substituted perylene bisimide (pbi) is found to generate a columnar phase, which unfolds and gradually transforms to a completely nanosegregated multilayer columnar-lamellar liquid crystal. the structure is based on the formation of bundles of h-bonded pbi strands in the central layer. this design opens the way to new complex multifunctional materials. this journal is"
Orodepo, G. O., Bhoje Gowd, E., & Ramakrishnan, S.. (2020). Periodically spaced side-chain liquid crystalline polymers. Macromolecules

Plain numerical DOI: 10.1021/acs.macromol.0c01888
DOI URL
directSciHub download

Show/hide publication abstract

"The melt-transesterification polymerization of diethyl malonate derivatives bearing a pendant mesogen, with ?,?alkanediols of varying lengths generated a series of side-chain liquid crystalline polymers, wherein the intervening backbone alkylene spacer segment was systematically varied; the effect of the backbone spacer segment on the liquid crystalline property was examined using differential scanning calorimetry (dsc), x-ray scattering, and polarizing light microscopic investigations. two different mesogen units, based on 4,4'-dialkoxydiazobenzene or 4,4'-dialkoxybiphenyl, were examined; it was seen that most polyesters derived from the diazobenzene mesogen exhibited a stable nematic mesophase, whereas most of those based on biphenyl transformed directly to an isotropic melt. x-ray scattering studies revealed that the polymers carrying biphenyl units formed a well-ordered lamellar structure in the solid state, which was interpreted as being generated via the zigzag folding of the polymer backbone, thus permitting the pendant mesogens and the folded backbone to occupy alternate layers. based on the slope of the linear variation of the interlamellar spacing as a function of backbone segment length, it was inferred that the backbone is not in an extended all-trans conformation but is disordered; from the value of the intercept, which roughly corresponded to the length of an extended pendant mesogenic segment, it was inferred that the pendant mesogens were interdigitated. the formation of a highly ordered structure in the solid state appears to drive up the melting transition and preclude the formation of the liquid crystalline (lc) phase in the biphenyl series; however, when a flexible hydrophilic tetra(oxyethylene) spacer was incorporated, the polyester revealed a stable mesophase owing to the significant lowering of the melting transition. comparison of

pairs of isomeric polyesters, one having the mesogen within the pendant segment and the other within the backbone, revealed the strong tendency for the main-chain isomer to exhibit smectic mesophases, whereas the side-chain isomer exhibited a nematic mesophase."

Category

1. General

Date Created
13. September 2021
Author
web45