1P-191
Electrical & Mechanical properties of silver nanowire coated EMI shielding films of flexible devices
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Recently, the advancements in flexible devices (FDS) have been rapidly moved from curved to foldable devices due to the increase in demands for portable devices. It is required to the high deformation limitations for the transparent EMI shielding films. The conventional ITO films are brittle and tend to electrically break down when the radius of curvature becomes lower than 5 mm which is the critical radius of curvature (ROC) required for foldable devices. Thus, there is an increasing need for new transparent conductive materials with high mechanical flexibility. In our study, the mechanical limitations of silver nanowire (Ag NWs) for flexible devices were investigated by tensile and buckling deformations. The elastic fracture of the Ag NW at ~2.5% strain was shown in the tensile stress mode, and in the buckling stress the critical radius of curvature was greatly extended to a few micron ranges. It indicates that the resistance to deformation of the Ag NW films is better than ITO films.

Keywords: EMI, Flexible

1P-192
Synthesis and device performances of dibenzothiophene & carbazole based host materials for blue phosphorescent organic light-emitting diodes
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In this study, dibenzothiophene based host materials were synthesized by connecting carbazole via different substitution positions of the carbazole moieties on 2-, 8- position of dibenzothiophene. These three materials, 2,8-bis[9-phenyl-9H-carbazol-1-yl]dibenzo[b,d]thiophene (1Cz-DBT), 2,8-bis[9-phenyl-9H-carbazol-3-yl]dibenzo[b,d]thiophene (2Cz-DBT) and 2,8-bis[9-phenyl-9H-carbazol-4-yl]dibenzo[b,d]thiophene (3Cz-DBT) have a high triplet energy (~2.61 eV) and thermal stability. The 1Cz-DBT host material has shallower the energy level which can be matched with that of blue phosphorescent material, iridium(III) tris[2,2-diisopropyl-5-(3,5-dimethyl-4H-thio-2,5-dihydrofuran-3-yl)]-(Ir(dbi)3). Therefore, maximum quantum efficiency of the 1Cz-DBT device was 25.4% and maximum power efficiency was 59.2 lm/W. The color coordinates of the 1Cz-DBT, 3Cz-DBT and 2Cz-DBT devices were (0.19, 0.39), (0.19, 0.40) and (0.19, 0.39), respectively. Additionally, the operational lifetime of 1Cz-DBT, 3Cz-DBT and 2Cz-DBT devices were observed as 50 h, 303 h and 1,000 h at 1,000 cd/m², respectively.

Keywords: Lifetime, Host materials, Blue PHOLED

1P-193
Structural color of colloidal crystals with Fe₃O₄@C nanoparticles in polar solvent with surfactants
김성환*, 이성용

The high cost, brittleness, and high temperature processing of indium tin oxide (ITO), commonly used in optoelectronic applications, boosts a search for alternative electrode technologies. The conductive polymer poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) is in particular regarded as a promising electrode material due to its good optoelectronic properties and mechanical flexibility. In this work, we report 1,3-dimethyl-2-imidazolidinone (DMI) as a solvent for PEDOT:PSS for improving the conductivity of films. The electrical and optical performance of PEDOT:PSS films with the new solvent is compared with those of films doped with a conventional solvent. Moreover, a solvent post-treatment is performed to further improve the conductivity of PEDOT:PSS films. The post-treated PEDOT:PSS films shows a significantly reduced sheet resistance compared to untreated films. In addition, the PEDOT:PSS films are adopted as a bottom electrode for organic light-emitting diodes.

Keywords: Transparent Electrodes, PEDOT:PSS, Conducting Polymer
물성 변화가 매우 크기 때문에

**1P-198**
Electrical and optical properties of ITO film on PET by roll to roll sputtering and its application in touch screen panel

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(ITO 필름의 제작 시 공정 변수에 따라 ITO 박막이 전기적 광학적 물성 변화가 매우 크기 때문에, 공정 변수에 따른 ITO 박막의 전기적, 광학적 특성 변화에 대한 연구의 필요성이 더욱 높어지고 있다. 따라서 본 연구에서는 롤투롤 스 쌓기 방법으로 ITO 필름을 제작한 후에 다양한 조건으로 ITO 박막을 증착하여 공정 변수에 따른 ITO 박막의 물성을 조사하였다. 이를 위해 4차원 분석기를 사용하여 DC 파워와 산소 분압에 따른 ITO 필름의 전기적 특성을 분석하였다. 또한, 인덱스 매칭으로 ITO 필름을 제작하여 타라신 매칭소자로 사용하기 위한 기초 물성을 보고하고자 한다.

Keywords: ITO, Touch screen panel, Roll to roll sputtering

**1P-199**
Organic small molecules functionalized blue light-emitting electrochemical cells

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Light-emitting electrochemical cells (LECs) is regarded to be the potential candidate to replace-expensive organic light emitting diodes (OLEDs) because LECs have many advantages such as simple device architecture and air stable electrodes. Our previous reports suggest that phenantroimidazole derivatives can function as an emitter in the light emitting electrochemical cells. However, in that case the synthesized molecule emits in the sky blue region in its solution and yellowish green in the light emitting electrochemical cell. Learning from that, a phenantroimidazole derivative is designed here to get a short conjugated molecule which is emitting in the deep blue region of the spectrum. Furthermore, the synthetic strategy is extended to obtain an ionic deep blue emitter, which may facilitate the use of this molecule in LEC devices without any additional ions. Since the deep blue emitter for LEC devices are rare to this date, the report on easily accessible deep blue emitter for electrochemical cells could be a significant achievement in the research of LEC devices.

Keywords: light-emitting electrochemical cells, Organic small molecules

**1P-200**
Synthesis and characterization of benzothiadiazole derivatives as organic semiconductor for organic thin-film transistors

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New benzothiadiazole derivatives end-functionalized with carbazole and α-carboline, 4,7-dih(9H-carbazol-9-yl)benzo[1,2,5]thiadiazole and 4-(9H-carbazol-9-yl)-7-(4-pyridyl)(2,3-hindol-9-yl)benzo[2,1,5]thiadiazole were synthesized and characterized as organic semiconductors for organic thin-film transistors (OTFTs). Compound 1 exhibited p-channel characteristics with carrier mobility as high as 10^-4 cm^2/Vs and a current on/off ratio of 10^5 for top-contact/bottom-gate OTFT devices.

Keywords: organic thin-film transistors, benzothiadiazole, carbazole, self-assembled monolayer

**1P-201**
Modification of the IT epoxy adhesive for low-temperature curing property by Sol-Gel method

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Light emitting diodes (LEDs) have increasingly been studied for application in the fields of displays and lighting to fabricate environmentally friendly illumination devices with low energy consumption. The LED adhesive is essential to stick the light diffusion lens on the substrate for smooth and bright light of the LED. The LED lens adhesive shows different characteristics with general epoxy adhesives such as low-temperature and fast curing. However, it is generally imported from abroad and used. Therefore, a new material which developed by domestic technology is required. In this study, We synthesized Oligoisoaxiane resins with the higher degree of condensation indicated low shrinkage and effective curing behavior via non-hydrolytic sol-gel method. It was introduced as a hardner of epoxy adhesive to improve the low-temperature curing property and Pot-life. The curing property was analyzed by Differential Scanning Calorimetry (DSC).

Keywords: TT Epoxy adhesive, LED, Curing characteristic

**1P-202**
The synthesis and application of green phthalocyanine dyes as synergists for improving contrast ratio of liquid crystal displays

강성현, 김세훈, 김재성

The synergists interact both pigments and dispersants so as to improve dispersion of the pigment particles. Therefore, synergists are applied to increase the contrast ratio. Here, phthalocyanine dyes as green color synergists were synthesized. The synergists that have different functional group at the end show various properties and performance. Spectral properties and particles size on colorfilter substrate were investigated by UV-Vis spectroscopy and SEM respectively. Consequently, the contrast ratio increased by adding the novel synergists and this study showed that the phthalocyanine derivatives as synergists can effectively improve the performance of liquid crystal display.

Keywords: Liquid crystal display, color filter, synergist, contrast ratio, phthalocyanine

**1P-203**
Fabrication of organic / inorganic hybrid blue pigment particles for color filter

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The color filter with the red, green and blue pigment derived from mill-base processing is known as essential components of the liquid crystal display (LCD). Among these, the color properties of Cu-Phthalocyanine(Cu-Pc) mainly have used as blue pigment. Particularly, the particle size and distribution have played an important role in the performance of color filter. In this study, we fabricated Cu-Pc-modified SiOx, core-shell composite particles to enhance dispersion and storage stability in organic solvent. The surface of Cu-Pc was coated with SiO2 by hydrolysis of Na2SiO3. The obtained particles were then modified with 3-mercaptocaproyltrimethoxysilane to form composite particles containing thiol groups. After surface modification of composite particles, different type of copolymers designed as a role of the binders were grafted onto the surface of composite particles via radical polymerization by thiouene reaction.

Keywords: Surface modification, Copper Phthalocyanine, Color Filter, Core-shell structure