

Molecular Design of Hole-Transporting Material for Efficient and Stable Green Phosphorescent Organic Light-Emitting Diodes

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Phosphorescent organic light-emitting diodes (PHOLEDs) have been actively investigated because their emission efficiencies are higher than those of conventional fluorescent OLEDs. However, there are few reports on hole transporting materials (HTMs) suitable for highly efficient and stable PHOLEDs. We examined the HTM-dependent device characteristics of green PHOLEDs using an electron-transporting host. The emission efficiency of the PHOLEDs was proportional to the optical band gap and the triplet energy of the HTMs. On the other hand, the operational stability of the PHOLEDs was not proportional to the emission efficiency. By analyzing the device characteristics in relation to the molecular structure of HTMs, an amine derivative with dibenzothiophene was found to be an effective HTM for highly efficient and stable green PHOLEDs.

A Lightweight Push-pull Acoustic Transducer Composed of a Pair of Dielectric Elastomer Films

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A usable audio system for listeners is required for 8K Super Hi-Vision audio in homes. We propose a lightweight push-pull acoustic transducer using dielectric elastomer films for that purpose. The push-pull structure consists of two dielectric elastomer films developed to serve as an electroactive polymer. The transducer utilizes the change in the surface area of the dielectric elastomer film, induced by an electric-field-induced change in the thickness, for sound generation. The resonance frequency of the transducer was derived from modeling the push-pull configuration to estimate the lower limit of the frequency range. Measurement results revealed an advantage of push-pull driving in the suppression of harmonic distortion. The acoustic transducer's total mass of 60 g makes it much lighter than conventional dynamic loudspeaker units of similar size, which generally weigh more than 1 kg. It solves one of the problems involved in installing advanced audio systems in homes, which is the increased weight resulting from using many loudspeakers.

Twitter Analysis Algorithms for Intelligence Circulation System

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The convergence of broadcasting and broadband communications network technologies has attracted increasing attention as a means to enrich the television viewing experience of viewers. Toward this end, this study proposes the 'Intelligence Circulation System (ICS)', which provides several services, by using newly developed algorithms for analysing Twitter posts (Tweets). An evaluation of our algorithms using Tweets about all programme genres for a month showed that the accuracy of topic extraction was 65%. The accuracy of message sentimental classification was 66%. We also describe social recommendation services using the analysis result. We have created a Social TV site for a large-scale field trial, and we have analysed users' behaviours by comparing four types of social recommendation services on it. The experimental result shows that active and passive communication users had different needs with regard to the recommendations. ICS can generate recommendations for satisfying the needs of both user types by using the analysis result of Tweets.

UHDTV (8K) Distribution Technology and Field Trial on Cable Television Networks

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UHDTV (8K) needs a much larger transmission capacity for broadcasting than HDTV. We first developed a technology for transmitting signals on cable television networks. We utilize channel bonding technology for the cable distribution and developed extended modifications to the frame structure of ITU-T J.183. Our newly proposed time-division multiplexing (TDM) frame format can be used commonly in the transport layer regardless of the format of the physical layer. A 181.2-Mbps MPEG-2 TS of signal transmitted by a 64-QAM and four 256-QAM channels was received error-free at our prototype set-top box through a cable television operator's existing facilities. We demonstrated cable television distribution in which a received program was stably played on an 8K display with 22.2-multichannel sound at the reception site.