Treatise

A Digital Rights Management System for Digital Broadcasting Based on Home Servers

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This paper presents a digital rights management (DRM) system for digital broadcasting based on home servers (DBHS) using receivers with large-capacity storage devices. DBHS will enable viewers to enjoy 'television anytime/anywhere' by utilizing these storage functions. Our proposed DRM system is suitable for broadcasting, and allows both rights protection and advanced access to content held on home storage devices (in terms of validity, usage and charge conditions, and so on). We developed a prototype DRM system using a Pentium3 personal computer (1 GHz) in order to evaluate the non-linear playback and 'trick-play' modes of encrypted content on the hard disk drive (HDD). Using this prototype, we confirmed that the non-linear playback of content encrypted using the proposed DRM system could be processed in real time. The functionality in terms of trick-play modes was equal to that of commercially available hard disk recorders. In addition, we developed a security module for the DRM system in the form of a smart card with a built-in processor. We confirmed that the proposed DRM system utilizing the new smart card could be applied to DBHS.

Calculation of Secondary Electron Emission Yield γ from MgO Surface

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Secondary electron emission yield γ values for rare-gas particles (He, Ne, Ar, Kr, and Xe ions of atoms and molecules, metastable atoms, and excimers) of MgO deposited under optimum conditions for the highest γ values were calculated assuming the Auger transitions between the valence band and the F (oxygen ion vacancy + two electrons) and F^+ (oxygen ion vacancy + one electron) centers in the MgO surface. As for combination of the MgO with these rare-gas particles, all the calculated γ values fall to non-zero; resonance neutralization cannot occur for the rare-gas particles. Therefore, γ values of the MgO for these rare-gas particles are determined only by Auger neutralization. The γ values for the ions of atoms are a little larger than those for the ions of molecules. The γ values of the metastable atoms are also a little larger than those of the excimers. As for MgO without defect states, the calculated γ values of Ar, Kr, and Xe ions of atoms and molecules fall to zero; the calculated γ value of Xe_2 excimer at the lowest continuous spectrum also falls to zero; these γ values for MgO without defect states are probably the lowest values theoretically. As for rare-gas ions of atoms, the calculated γ values have been compared with experimental results reported previously. These results will be useful in detailed investigations into the mechanism of discharge of PDPs.

Efficient Organic Light-emitting Devices using an Iridium Complex as a Phosphorescent Host and a Platinum Complex as a Red Phosphorescent Guest

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Organic light-emitting diodes (OLEDs) have attracted attention because they can be used in full-color flat-panel displays. The incorporation of phosphorescent material as an emitting guest into OLEDs has made these devices more efficient. Usually the phosphorescent guest is doped into a host material with a concentration of 3-10 wt% to increase the probability of recombination on the guest or Dexter energy transfer from the host to the guest. However, if the guest concentration is too high, the OLEDs face the problem of concentration quenching or triplet-triplet annihilation, which leads to lower efficiency. As a solution to this problem, we used the phosphorescent material also as the host. In a device with a phosphorescent host/guest system, the efficient energy transfer from the host to the guest by the long-range and rapid Förster process will occur even at low guest concentrations. We demonstrated an efficient OLED using an iridium complex as the phosphorescent host and a platinum complex as the red phosphorescent guest. The OLED showed an ideal red emission. External quantum efficiency was as high as 8.3% even with a low guest concentration (1 wt %). The driving voltage of the OLED was much lower than the device using a conventional host. Due to the reduced driving voltage, the power efficiency also improved.