A fundamental element of stereoscopic image production is to geometrically analyze the conversion from real space to stereoscopic images by binocular parallax under various shooting and viewing conditions. To evaluate the relationship between visual angle and the sense of presence for wide displays, two experiments were conducted in which the visual angle (five visual angles ranging from about 30 to 100°) was manipulated as a between- and within-subjects factor, respectively. An ultrahigh-definition projector system was used to present images for evaluation. The system has a high resolution of equivalent 4320×7680 pixels using the pixel offset method, in which two 2160×3840-pixel LCOS (liquid crystal on silicon) panels were offset diagonally by 0.5 pixel for the green channel. Two-hundred subjects participated in both experiments; the subjects were divided into five groups of 40 subjects for each visual angle in the between-subjects design. In the within-subjects evaluation, presence scores increased as the visual angle widened, while those in the between-subjects evaluation did not increase significantly for a wide visual angle above 80°. It can be concluded that the “contrast effect,” i.e., a bias caused by comparing different visual angles, greatly affects the ratings of sense of presence.

Highly Efficient, Low-voltage Phosphorescent Organic Light-emitting Diodes Using an Iridium Complex as the Host Material
Toshimitsu Tsuzuki and Shizuo Tokito

Organic light-emitting diodes (OLEDs) that use phosphorescent metal complexes as an emitting material have been attracting a great deal of attention because they exhibit higher efficiency than OLEDs that use conventional fluorescent materials. Usually the phosphorescent materials are doped as emitting guests into charge-transporting host materials to obtain high efficiency. We have created an efficient OLED that can be driven with a low voltage by using the phosphorescence material bis(2-phenylpyridinato-N,C2')iridium(acetylacetonate) [(ppy)Ir(acac)] as the host. The OLED with (ppy)Ir(acac) as the host and tris(1-phenylisoquinolinolato-C2,N)iridium(III) [Ir(piq)3] as the red phosphorescent guest exhibited a substantially lower driving voltage than the OLED with the conventional host of 4,4'-bis(N-carbazolyl)-1,1'-biphenyl (CBP). The reduction in the driving voltage resulted from (ppy)Ir(acac) having a narrower HOMO-LUMO energy gap than CBP. The driving voltage at a luminance of 100 cd/m2 was 4.4 V. A maximum external quantum efficiency of 9.2% and a maximum power efficiency of 11 lm/W were obtained. The durability of the OLED under a constant dc current was also improved by using (ppy)Ir(acac). The lifetime, which is defined as the time for the luminance to decay to half of the initial luminance of 1,000 cd/m2, was only 52 hours for the OLED with CBP, whereas it was 320 hours for the OLED with (ppy)Ir(acac).

Contrast Effect in Evaluating the Sense of Presence for Wide Displays
Kenichiro Masaoka, Masaki Emoto, Masayuki Sugawara, Yuji Nojiri

Organic light-emitting diodes are becoming the preferred viewing media in video. It is generally believed that a wider visual angle increases the sense of presence for the viewer.

To evaluate the relationship between visual angle and the sense of presence for wide displays, two experiments were conducted in which the visual angle (five visual angles ranging from about 30 to 100°) was manipulated as a between- and within-subjects factor, respectively. An ultrahigh-definition projector system was used to present images for evaluation. The system has a high resolution of equivalent 4320×7680 pixels using the pixel offset method, in which two 2160×3840-pixel LCOS (liquid crystal on silicon) panels were offset diagonally by 0.5 pixel for the green channel. Two-hundred subjects participated in both experiments; the subjects were divided into five groups of 40 subjects for each visual angle in the between-subjects design. In the within-subjects evaluation, presence scores increased as the visual angle widened, while those in the between-subjects evaluation did not increase significantly for a wide visual angle above 80°. It can be concluded that the “contrast effect,” i.e., a bias caused by comparing different visual angles, greatly affects the ratings of sense of presence.