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The Optimization of Red Phosphor for Plasma Display Panel by Combinatorial Chemistry Method

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Several borates of Y, Gd, Sc, and Lu are known to be good host materials under the vacuum ultra violet (VUV) excitation so that they can be used for Plasma Display Panel (PDP) When activated with Eu^{3+} ions they emit a considerably bright red light under the VUV excitation. The present investigation aims at the screening of all the possible compositions that the above four borates constitute. For this sake, the combinatorial chemistry technique was adopted. The combinatorial chemistry technique is very powerful to find the optimum composition of target phosphor The quaternary library (borate of Y, Gd, Sc, and Lu) was easily achieved by using a tetrahedron-type composition array. In parallel, another quaternary system consisting of boro-phosphate of Y and Gd was also screened by the same method. Based on the results, the final screening was performed using ternary combinatorial chemistry with the variation of Y, Gd, and Eu, thereby determining the optimum composition of the highest luminance.

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Optimization of a new long phosphorescent phosphor $SrAl_2O_4 \cdot Eu^{2+}$ with co-dopants by combinatorial method

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A green emitting $SrAl_2O_4 : Eu^{3+}$ phosphor with very bright and long lasting phosphorescence has been developed We improve phosphorescence chracteristics of the $SrAl_2O_4 \cdot Eu^{3+}$ phosphor by means of the incorporation of auxiliary activators (Nd^{3+}, Dy^{3+}, Ce^{3+}, Pr^{3+}) in particular various trivalent rare earth ions. The combinatorial approach has been applied to discover and optimize the composition. This method enable much more rapid search of optimum compositions of target phosphors and analysis of large samples to be designed than conventional method. As a results, we have prepared in developing a new phosphor $SrAl_2O_4 \cdot Eu^{3+}$ with co-dopants which shows extremely bright and long phosphorescence Evidence is presented for the mechanism that the phosphorescence is ascribed to the photoconductivity due to holes, and to the trapping level located at a suitable by various ions in the system Optical characteristics including phostoconductivity and thermoluminescence of the new phosphor have been examined In addition , the mechanism of the very long phosphorescence has been discussed and elucidated