IRIIE 2010

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيورسيتي إسلام انترناسيونل ملايسيا

IIUM Research, Innovation & Invention Exhibition 2010 (IRIIE 2010)

ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

P-49 Green Technology of Energy-Efficient Materials up to 70% for Plasma Display Panel

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A plasma display panel (PDP) is a type of flat panel display common to large TV displays (32" inches or larger). Many tiny cells between two panels of glass hold a mixture of noble gases. The gas in the cells is electrically turned into a plasma which then excites phosphors to emit light. One of major part in the plasma display panel is its protecting layer. MgO thin film has been widely used as a protective layer for dielectric materials. An addition material to MgO as base material is an alternative method for improving its property as protective layer. A study of reducing the surface discharge potential of single pure MgO protecting layer by the addition of ZrO2 with several compositions is presented. The discharge properties approach taken is by utilizing the flashover treeing for material characterization, produced by a scanning electron microscope (SEM). From the experiment, ZrO2 addition into high purity MgO has influenced the property of MgO. Since secondary electron emission coefficient contributes in increasing the electric field of the surface, it could be found that 5 wt% ZrO2 added MgO has highest secondary electron emission coefficient because the charging and discharging process happened within a shorter time. Therefore comparing with pure MgO, this new material could increase the efficiency of the energy consumption of a plasma display up to 70%.

P-50 Novel Nuclear Technology for Controlled Production of n-type Semiconductor

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Use of semiconductors for power electronics requires unique material characteristics because of the high power levels flowing in the devices. In this research, NTD silicon was try to be developed by using Cf-252 isotopic neutron radioactive sourced (1.6 mCi) instead of using neutron source from nuclear reactor. It was found that concentration of P between 0.5 and 14 wt% could be produced by irradiating silicon using netron between 1 and 5 days. It was proved that the irradiation time did not change the mechanical property of the material.

P-51 First Principles Study on Influence of Magnetic Materials on the Dissociative Adsorption of Oxygen

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Platinum-based transition metal alloys have shown to have greater activity than pure platinum for catalyzing oxygen reduction reaction. Hence, clarifying the magnetic effect in catalytic reaction becomes very crucial. In one of Kasai group's studies, using first principles calculations based on density functional theory (DFT), it is shown that in dehydrogenation of cyclohexane, catalytic reactivity of spin-polarized nickel is close to that of platinum. In one of their next studies using DFT based first principles calculations, they have shown that on the Mg–H dissociation of MgH_2, Sc and Ni have the highest catalytic activities among the 3*d* transition metals (Sc-Zn). In their another study, they have shown that Pt monolayer on Fe(001) surface (Pt/Fe(001)) can be magnetized resulting to a reduction of activation barrier in O_2 dissociative adsorption in half as compared to the case of bare platinum surface. So as a next step, it is of importance to study how another magnetic material Ni influences this reaction by the same calculation method mentioned above. We consider O_2 dissociative adsorption on Pt/Ni(110) which has been experimentally fabricated .