

γ -irradPE: Biopolymer in Renewable Energy Development

In today's world, polymer electrolyte is becoming one of the vital components that are used in renewable energy device applications. For instance, thin film solid polymer electrolyte can be used as a separator in the rechargeable batteries. Numerous methods have been developed by researchers in order to fulfill the electrochemical properties so that it can be used in these energy device applications. In order to produce a perfectly workable thin solid polymer electrolyte, the formulation is always the biggest issue that needs to be rectified, as solid polymer electrolytes tend to have low electrical efficiencies.

On the other hand, in the recent emerging field of green chemistry, researchers have tried to look for more environmentally friendly chemicals and processes for industrial use. For these reasons, γ (Gamma)-irradPE was developed. γ -irradPE is a formulated polymer electrolyte film that is biodegradable, renewable and cost effective as it is basically based on cellulose acetate. This technique can be implemented in the fabrication of bio-oriented electrolyte building blocks for its application in various electrochemical devices such as batteries, super capacitors, solar cells etc. As for the electrochemical properties, gamma irradiation

technique was used to enhance the electrical performances of this thin polymer electrolyte. In justifying this method, a thin polymer electrolyte which has anionic conductivity of 1.58×10^{-4} S/cm was enhanced by more than two hundred percent after 30 kGy dose of gamma irradiation was applied. This thin film was also sustainable up to temperatures of 100 °C and was found to have a continuous rise in ionic conductivity with increase in temperature. The other benefits obtained using irradiation method are the sustainability of purity and sterility of the samples as well as temperature independent of reaction initiation. The innovation of this method was found to have a significant practical need in commercial markets in fabricating electrochemical devices.



Dr. Ramesh Kasi (second from left) and his team with their awards at MTE 2014

Awards

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Malaysian Technology Expo (MTE 2014)

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Figure 1: Irradiated Polymer Electrolyte Sample



Figure 2: Potential Product Developments

Measuring Postural Abnormalities

We always hear that having a good posture is important for good health. Posture is the position in which our bodies are stabilised while standing, sitting, or lying down. Having a good posture is the correct alignment of body parts supported by the appropriate amount of muscle tension. Human posture may negatively change with time, and these abnormalities may go unnoticed if not periodically checked. Many factors may influence these changes; namely lack of physical activity, and having bad posture habits. Both these factors are very much related to lifestyle. Clear examples are evident in children who spend long hours playing computer games with problems related to head and shoulder abnormalities, which in turn may affect their stability and balance, or even habits of carrying overloaded bags on one shoulder for prolonged period may lead to scoliosis or uneven shoulder.

Sports Centre and Faculty of Engineering at the University of Malaya have teamed up in designing reliable, valid and yet easy to use devices in measuring human posture. In the past measuring human posture was a laborious process using photographs and at time X-ray which exposes one to health risks. Hence light and compact tools with high precision are deemed more appropriate in this modern era. These inventions are a breakthrough in providing health specialist; doctors, physiotherapist, rehabilitation experts, as well as physical educators, fitness instructors including researcher's measurements that are quantifiable for accurate assessments. All measurements could be easily evaluated with standard norms for male and female. Hence the level or degree of severity could be promptly assessed and proper corrective measures could be prescribed accordingly. It is only by doing specific exercises that these abnormalities could be corrected.

The tools invented are able to measure all major joints including peripheral

extremities, for example fingers and toes.

The material is made from plexiglass which is safe to be used on human, and calibrated digitally using laser. Apart from joints, foot sole measurements could also reflect flat-footedness. A list of major test includes:

Uneven shoulders and hip: This device can measure the balance of shoulders and hip. For measuring shoulders, each tool arm is placed on the acromial process of each shoulder. For hip measurement, each tool arm is placed on the anterior superior iliac spine (left and right).

Head forward: This device measures the human head forward displacement from the neck. This is measured from the 7th cervical bone (C7) with the arm tool tangent to the auricle.

Shoulders forward: This device can measure how much shoulder displaces in front of the body. While the body presses against a wall, a pointer on the tool touches the acromial process on the body, to determine the displacement.

Kypho-Scoliosis meter: This device can measure the kyphosis, lordosis, and scoliosis in spine. This device measures the degree of curvature of the spine.

Goniometer: This device can measure the range of motion of various joints around the body.

X and Parenthesis knee (bone caliper): This device can measure the X or parenthesis knee. It has two models. Together with a goniometer the distance between the internal malleolus and external condyle of femur when both legs are close together is measured.

Foot sole platter: This device shows the shape of foot sole. Flat-footedness could be easily assessed.

Poster of Posture screen: This large size of raster graphic page scaled to precision showing the distance of human body parts.

These inventions will be used for the first time in Malaysia to measure postural abnormalities among school children.

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International Invention, Innovation & Technology Exhibition (ITEX) 2013

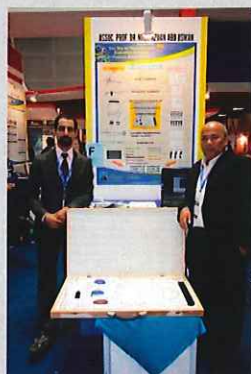
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UI 2012005293: Measurement Tool Box for Assessing Human Postural Abnormalities

PI 2012701032: Device for Measuring Head Forward



■ Prof. Ir. Dr. Noor Azuan (right) and his team



■ Measurement Tool Box Human Abnormality



■ Tool Box for Measuring and Evaluation of Human Postural Abnormalities