Synthesis of nata de coco fiber composite with conductive filler as an eco-friendly semiconductor material

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Abstrak

The electronic industry’s need for semiconductor material is increasing each year due to technology’s rapid development. Semiconductor material has an electric conductivity of approximately 10-8-103 S/cm, and it is used as an important component in electronic devices. Semiconductor material is generally made of plastic modified with conductive filler. The problem with using semiconductor material is that the discarded components can be plastic waste that requires significant time to degrade; therefore, the synthesis of semiconductor material from natural substances must be observed. One of these natural substances is nata de coco fiber modified with a conductive filler. The impregnation method is used in the synthesis of the nata de coco fiber composite. The fillers used in this study are ZnO and silica, and the size of the filler particle and the concentration of the filler suspension are used as variations. From the SEM-EDX results, it can be seen that the filler is successfully deposited on the nata de coco fiber. Silica filler gives a higher conductivity than ZnO filler because of its lower energy band gap. The highest conductivity result is obtained from the composite impregnated in a 0.3-0.4 mm particle diameter of filler with 3% w/v suspension concentration for three days, producing the conductivity result of 6.95×10-6 S/cm for ZnO filler and 10.1×10-6 S/cm for silica filler, or about 16 times higher than the conductivity of nata de coco fiber.