Kuan Yew Cheong et al., Int J Mater Sci Res. 2019
DOI: http://dx.doi.org/10.18689/2638-1559.a3.001

Kuan Yew Cheong* and Zhe Xi Liml

Universiti Sains Malaysia, Malaysia

Natural *Aloe vera* as a Sustainable Electronic Material for Neuromorphic Computing

Internet-of-things (IoT) connecting human with machine through internet aiming to resolve issues of security, health, comfortability and connectivity but attributes to two major global issues, namely waste of energy and disposition of electronic waste. By combining computer hardware (microprocessor) with sophisticated software programming, IoT gadgets with "brain-like" characteristics can be made. However, this artificial intelligent (AI) requires extremely huge amount of energy in order to successfully accomplish an assigned task. In comparison to a human brain, only a sub-fraction of the energy is needed. This is due to the constraint of current technology that utilizing conventional von Neumann architecture type of hardware. The more complicated task to be accomplished by an AI (here mostly refers to software driven type of system), the more energy is required. Even though AI-assisted IoT may benefit mankind as a whole, however, it would significantly worsen issues of energy shortage globally. The imbalance of energy supply (both from renewable or non-renewable source) and demand (escalating needs, production and consumption of smart gadgets related to IoT) desires much attention. Since the number of smart gadgets related to IoT is exponentially increasing, electronic waste, due to short usage time, may also contributing to other global issues namely environmental, health and sustainability of resource. In order to resolve these two global issues, natural organic materials, such as *Aloe vera*, that are sustainable, biocompatible and biodegradable, can be extracted, formulated and processed into a thin film that can be used as the next generation "brain-like" or neuromorphic computer, which operating with much lower energy required by current technology. In this Lecture, historical development of neuromorphic computing both from the perspective of research and commercialization will be presented. Important components needed for this system would be elaborated with the emphasis of artificial synapses, which serves as an interface between two or more connects for transmitting, processing and storing data with ultra-low energy. This is mimicking a biological synapse in a human brain that connecting neurons.

Biography

Currently, Prof. Cheong is a Fellow of The Institution of Engineers Malaysia (IEM), Senior Member of Institute of Electrical, Electronic Engineers (IEEE), member of Materials Research Society (USA), committee member of IEEE Electronic Packaging Society (EPS), Malaysia Section. He was the past Chairman (2009 – 2011) and Advisor (2011 – 2012) of Electronic Engineering Technical Division, IEM, a past Council Member of IEM (2009 – 2012), past Region Vice-President of Thin Film Society (2012) (http://www.thinfilms.sg/) and past Vice-Chairman of IEEE, Component, Package and Manufacturing Technology (CPMT) Society, Malaysia Section.