CHAPTER I
INTRODUCTION

The push to the development on bio-based materials has been evident from the past decades. Numerous efforts have been extensively researched to improve on both quality and quantity of bio-based materials such as cellulose, lignin, chitin-chitosan, polylactic acid as well as polybutylene succinate. Many approaches have been developed by extraction process of bio-based material from naturally renewable resource or bio-based synthetic route (Khalil *et al.*, 2012). For example, cellulose can be effectively prepared from isolation of wood or biomass and fermentation technique of bacterial specie (Cao *et al.*, 2008; Cao *et al.*, 2008; Altmutter *et al.*, 2012; Faruk *et al.*, 2012; Shah *et al.*, 2013), whereas chitin and chemically modified chitin to be chitosan can be developed from lobster and shrimp (Kasaai, 2008; Bhatnager *et al.*, 2009; Pillai *et al.*, 2009; Jayakumar *et al.*, 2010). Moreover, polylactic acid and polybutylene succinate can be effectively prepared during condensation technique of cone and sugar cane, respectively (Erdohan *et al.*, 2013; Frollini *et al.*, 2013; Li *et al.*, 2013; Ojijo *et al.*, 2014). Up to the present time, the use of bio-based material can be versatile in numerous engineering sectors including infrastructure, automotive part as well as electronic device. Moreover, the role of bio-based material was commonly employed to use in many medical sectors including regenerative medicine, would healing and pharmaceutical technology.

From the viewpoint of environmental preservation, "Green technology" policies have been extensively encouraged by many governments and any relevant organization (Eyraud *et al.*, 2013; Hall *et al.*, 2013; Zuo *et al.*, 2014). The definition of "Green marker" can be theoretically used in a predictive way, allowing the initiation of bioremediation strategies prior to the occurrence of irreversible environmental damage of ecological consequences. Due to these reasons, many approaches have been developed bio-based material for many possibilities to be used in application.

Recently, our research group was successfully developed bacterial cellulose from commercially available food product (Ummartyotin *et al.*, 2012). The extraction and purification method were employed to prepare bacterial cellulose. For our lab group research, the prospective application was extremely focused on the development of bacterial cellulose composite as electronic substrate with additional feature of flexibility and transparency. Moreover, Si-O barrier layer (Ummartyotin *et al.*, 2011) and ferro-fluid solution (Ummartyotin *et al.*, 2012) were employed to modify on water absorption reduction and surface smoothness of bacterial cellulose composite, respectively. In order to investigate the feasibility of flexible substrate, many preliminary steps of organic light emitting diode layer were deposited in order to exhibit the organic light emitting diode (Ummartyotin *et al.*, 2011; Ummartyotin *et al.*, 2012; Ummartyotin *et al.*, 2012; Ummartyotin *et al.*, 2012). Up to the present time, in order to facilitate to user, our substrate was developed for touch screen feature. Numerous approaches have been introduced metal or any nano-particle to bacterial cellulose for being as polar cluster (Kim *et al.*, 2006). Recently, O-Rak *et al.*, (2013) was successfully grafted carbon nanotube on the hydroxyl position of bacterial cellulose. Significant enhancement on dielectric and piezoelectric can be effectively observed for being as electro-mechanic response. On the other hand, in order to reach this objective, bacterial cellulose was successfully blended with poly(vinylidene fluoride) (PVDF). It was important to note that PVDF was considered as thermoplastic fluoropolymer that effectively provided strong polarization and subsequently offered high dielectric properties (O-Rak *et al.*, 2014).

Due to the achievement of bacterial cellulose and PVDF binary blend system and grafted carbon nanotube on bacterial cellulose. Our research group aimed to develop the novel type of hierarchical composite. AgNP was considered as conductive filler in order to fill in the free space of bacterial cellulose and PVDF binary blend system. The correlation among bacterial cellulose, PVDF and AgNP was evaluated. The role of AgNP was considered as conductive filler, whereas PVDF can effectively provide not only strong polarization to bacterial cellulose but also mechanical properties as well as thermal stability.

The objective of this research is to develop the novel type of hierarchical composite for touch screen feature. The correlation among AgNP, PVDF and bacterial cellulose was evaluated. Many properties were therefore investigated and discussed.