CHAPTER I
INTRODUCTION

The discovery of carbon nanotubes (CNTs) has inspired many researchers to innovate advanced materials for new applications since CNTs exhibit outstanding mechanical, electrical, and thermal characteristics. However, CNTs usually agglomerate due to strong van der Waals force, surface area, and hydrophobic interactions; these entanglements are able to cause many defects in composite materials. On the other hand, CNTs suspension is a significant factor to improve the properties of the original medium.

To disperse CNTs, a number of methods are suggested. Some are based on covalent modification of the tubes, which inevitably leads to undesired deterioration of the CNT properties. Alternatively, non-covalent modification through amphiphilic self-assembly can be used to stabilize the dispersion of CNTs in aqueous solution, by the electrostatic repulsion or steric hindrance of the micelles formed around them, without changing their chemical and electrical property. While, surfactants are employed in CNT dispersions, surfactant molecules work by adsorption at the sold-liquid interface and self-accumulation into supramolecular structures. Therefore, the CNTs structures are maintained after the modification.

The purposes of this work are to study the adsorption of surfactants on MWCNTs and to investigate multi-walled carbon nanotubes (MWCNTs) dispersion by using surfactants solution. Sodium dodecyl benzenesulfonate (SDBS), cetylpyridinium chloride (CPC) and polyoxyethylene octyl phenyl ether ($OP(EO)_{10}$) are used as anionic, cationic and non-ionic surfactants, respectively. The impact of surfactant concentration and the molecular structure of surfactants on the MWCNTs in solution are also investigated.