CHAPTER III
EXPERIMENTAL

3.1 Chemicals

3.1.1 Hydrogen peroxide (H_2O_2)

3.1.2 Ammonia 30% (NH_3)

3.1.3 Ethanol (EtOH)

3.1.4 Poly(diallyldimethylammonium chloride) 20%wt (PDADMAC) MW 200,000-350,000

3.1.5 Aniline monomer 99% ($C_6H_5NH_2$)

3.1.6 Poly(sodium 4-styrenesulfonate) (PSS) average MW~70,000

3.1.7 Poly(4-styrenesulfonic acid-co-maleic acid) sodium salt (CoPSS 3:1)

3.1.8 Poly(4-styrenesulfonic acid-co-maleic acid) sodium salt (CoPSS 1:1)

3.1.9 Sulfuric acid 96% (H_2SO_4)

3.1.10 Hydrochloric acid 37% (HCl)

3.1.11 Diammonium peroxodisulphate 98% (APS, $(NH_4)_2S_2O_8$)

3.1.12 Sodium chloride 99.5% purity (NaCl)

3.1.13 Ptassium dihydrogen Phosphate (KH_2PO_4)

3.1.14 Sodium hydroxide 99% (NaOH)

3.1.15 Sodium borohydride (NaBH)

3.1.16 Silver nitrate 99.8% ($AgNO_3$)

3.1.17 Chloroform ($CHCl_3$)

3.2 Equipment

3.2.1 Ultra Violet-Visible (UV-vis) Spectroscopy

UV-vis spectrophotometer use to find out the yield of polyaniline with various capping agents solution, monolayer and multilayer. Wavelength showed around 740-800 nm for green color or PNAI in form of acidic, and around 550 nm in form of basic. And the yield silver nanoparticles solution and monolayer films around 400 nm.

3.2.2 Transmission Electron Microscopy (TEM)

TEM use to confirm the nanoparticles of silver capped with three types of PANI. To observe the particles aggregated after synthesis.

3.3 Methodology

3.3.1 Synthesis Water-soluble Polyaniline

Water-soluble polyaniline was synthesized by interfacial polymerization technique consisting of aqueous and organic phase. First, prepared the aqueous phase 200 ml in 0.1 M H_2SO_4; 3 mM APS and 2, 4, 6, 8, 10, 15, 20 mM PSS, CoPSS (3:1) and CoPSS (1:1). Second, prepared organic phase 60 ml; 10 mM aniline monomer dissolved in $CHCl_3$. Next, poured organic phase into aqueous phase. Eventually, all these solutions were kept in 4°C 24 hours without agitation.

3.3.2 Synthesis Metallic Nanoparticles Composite

Metallic nanoparticles composite were prepared by polyaniline, silver nitrate and sodium borohydride. First, polyaniline was various dilution; 0.001, 0.005, 0.01, 0.05, 0.1, 0.3 and 0.6 ml in 15 ml DI water. Next, 15 ml of 1 mM of silver nitrate was added into each dilution of polyaniline and stirred until homogeneous. Finally, added 15 ml of 5 mM of sodium borohydride, stirred until homogeneous and kept it overnight.

3.3.3 Cleaning Substrate

The substrate had to clean before use by using HOT AMMONIA, 5: 1: 1, water: hydrogen peroxide: ammonia

3.3.4 Fabrication Polyaniline or Metallic Nanoparticles Composite

To be sure the metallic nanoparticles composite able to fabricate on the substrate primer had to build up 5 layers before dipped in polyaniline or metallic nanoparticles composite solution.

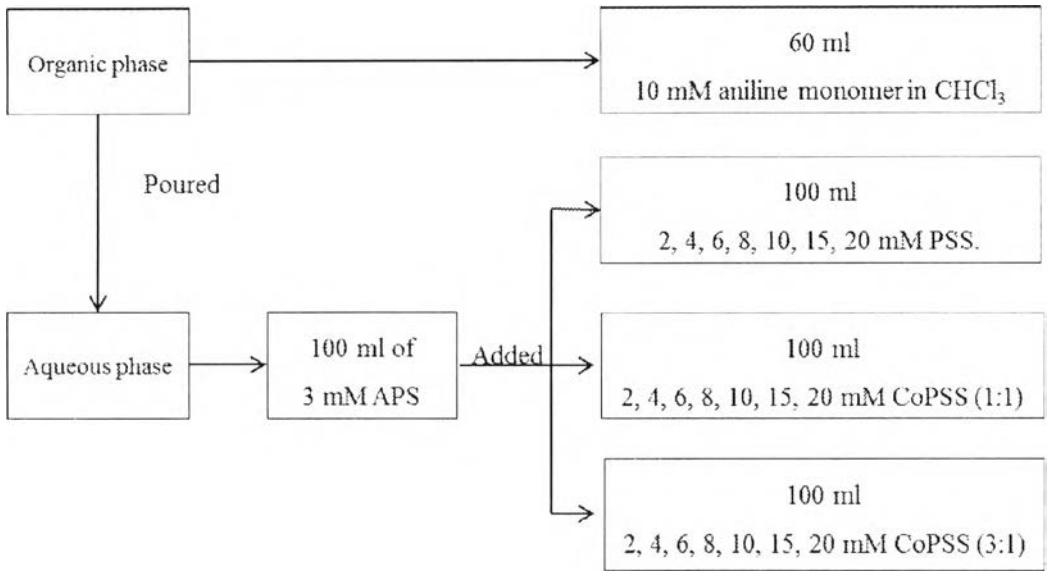

Figure 3.1 Flow chart water-soluble polyaniline preparation.

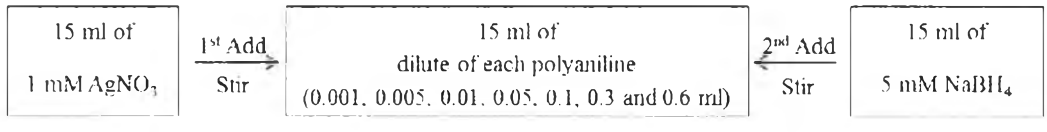

Figure 3.2 Flow chart of metallic nanoparticles preparation.

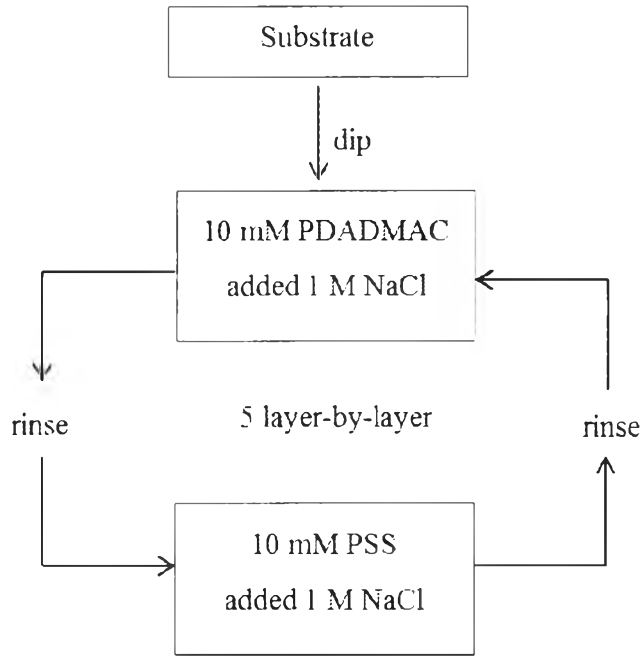

Figure 3.3 Flow chart of primer preparation.

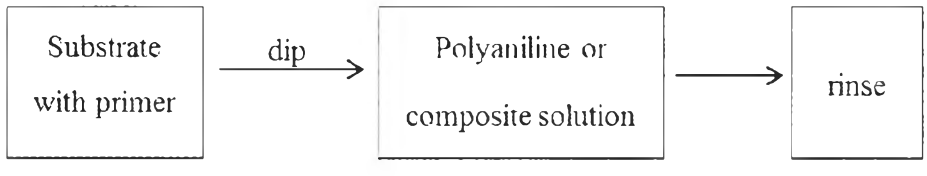

Figure 3.4 Flow chart of polyaniline or metallic nanoparticle film preparation.