CHAPTER I
INTRODUCTION

The ability to fabricate ultrathin titania film with controlled thickness to nanometer precision will open doors to important applications in the future. So far lots of processing techniques have been considered as candidates for the preparation of uniform amorphous and crystalline TiO_2 film such as sol-gel (Fang *et al.*,1999) , chemical vapor deposition, sputtering, atomic layer deposition (Aarik *et al.*, 2001) thermal evaporation (Cacciafesta *et al.*, 2002), Langmuir-Blodgett (LB) (Oswald *et al.*, 1999) and self-assembled monolayer (SAM) (Shin *et al.*, 1995). Recently, a novel method to produce ultrathin organic films via admicellar polymerization was successfully developed (Yuan *et al.*, 2002). By this method, the film thickness can be controlled by varying monomer loading (Wu *et al.*, 1987). However, to date no one has succeeded in producing inorganic thin films via this method. In 2002 Saphanuchart used admicellar polymerization to form ultrathin silica film on mica by adsolubilizing a silica precursor in adsorbed cationic surfactant aggregates with the resulted film analyzed by atomic force microscopy. One of the difficulties of this work was analyzing the structure of the silica film formed. In this study a titania ultrathin film was examined. However, the fabrication of a homogeneous thin titania film is difficult due to the spontaneous growth of single TiO_x "islands" during the initial stage of the film formation.

In this study the admicellar polymerization of tetrabutyl orthotitanate (TBOT) and tetraisopropyl orthotitanate (TIPP) adsolubilized in Triton X-100® admicelles to form ultra thin titania films on a nonporous substrate (mica) was investigated by atomic force microscopy (AFM). Effects of reaction time and concentration of precursors were studied. The reaction of precursors was examined both with and without surfactant.