CHAPTER I
INTRODUCTION

The International Union of Pure and Applied Chemistry (IUPAC) defined porous materials into three types base on their pore size: microporous (pore size < 2 nm), mesoporous (2-50 nm), and macroporous (>50 nm). Due to their advantages, such as thermal conductivity, electrical conductivity, chemical stability, and low density: Porous materials have been extensively studied and used in various applications, such as water purification, catalyst support, electrode material for energy storage devices etc. (Chaisuwan *et al.*,2011)

In general, porous carbon material made from catalytic activation and carbonization usually show the disordered structures with wide pore size distribution because of the etching process that are difficult to control. In order to generated the ordered structure of porous carbon materials, template synthesis method with controlled architecture and relatively narrow pore size distribution has been widely investigated.

The template synthesis method can be classified into two types, hard and soft template. The hard template carbonization approach, usually involves the following step: (a) the preparation of a porous template with controlled porousity; (b) the introduction of a suitable carbon precursor into the template pores by wet impregnation, chemical vapour deposition or a combination of both methods; (c) the polymerization and carbonization of carbon precursor to generate an organic-inorganic composite; and (d) the removal of the inorganic template by using HF or NaOH to yield a porous carbon. However, the drawbacks of hard template method are a multi-step and high cost, which may cause a barrier to industrial applications. (Xia *et al.*,2010)

To reduce the number of preparation steps and the cost involved in producing porous carbon materials, soft-templating method was use in this work. Our strategy is to use an organic-organic interaction between Polybenzoxazine, a thermosetting polymer and block copolymer Pluronic P123, a thermally decomposable surfactant to form a periodic ordered nanocomposite. The organic-

organic nanocomposite was pyrolyzed under nitrogen gas at high temperature. The effect of template loading content was investigated. The BET measurement was used to characterize surface area of nanoporous carbon. The morphology was determined by using SEM. The CO_2 treatment was also used to increase surface area of the resulting carbon.