

CHAPTER I

INTRODUCTION

Supramolecular chemistry is the chemistry based on molecular assemblies and intermolecular forces. There are several reports about unique property of supramolecules, especially inclusion phenomena between host and guest molecules (Steed *et al.*, 2009). Normally, structure of supramolecules can be acyclic structure such as cholic acid (Nungruethai *et al.*, 2007), cyclic structure, e.g., crown ether (G.W. Gokel *et al.*, 2004), cyclodextrin (J. Szejtli *et al.*, 2004), and calixarenes (C.D. Gutsche *et al.*, 2004) and hierarchical structure, sophisticated mechanically interlocked compounds with complicated structures, such as molecular shuttles (Anelli *et al.*, 1991), molecular elevators (Badjic *et al.*, 2006) and molecular necklaces (Kim, 2002).

Molecular necklace is development of topological structure based on connected macrocycles which can be formed by many methods such as aggregation (Feng *et al.*, 2010), complexation (Jones *et al.*, 2011) and copolymerization (Perrin *et al.*, 2009), e.g.

Benzoxazines are heterocyclic molecules derived from reaction of a phenolic derivative, formaldehyde, and a primary amine. Due to inter- and intramolecular hydrogen bonding in their structure, supramolecular structure of benzoxazine was obtained. For the past few decades, our group has successfully investigated a supramolecular phenomenon of benzoxazine. Chirachanchai *et al.* (2000) reported that benzoxazine monomer and its oligomer showed significant ion interaction among alkali and alkaline earth ions in the liquid-liquid phase. Moreover, benzoxazine has been developed not only the acyclic compound but also the cyclic compound of benzoxazine. Laobuthee *et al.* (2003) reported that macrocyclic benzoxazine was prepared by esterification and etherification providing high yield product.

Click chemistry is the reaction of azide and terminal alkyne leading to 1,2,3-triazole via copper(I). The advantages property of the triazoles that it is extremely rigid, ensuring that the two linked components is not interacting with each other. Moreover, click chemistry is known as having high efficiency, quantitative yields and selectivity reaction (Kolb *et al.*, 2001).

In this work, we propose molecular design and synthesis of molecular necklace based on the connected macrocyclic benzoxazine by Click chemistry.