CHAPTER I
INTRODUCTION

Electroactive materials have been used in many applications: sensing application which requires sensing materials; and electroactive actuators which can undergo a large amount of deformation in the field of robotics. Most of electroactive materials are made from metal alloys or electroceramics. The advantages are greater hardness or tensile strength and high thermal stability. The disadvantages are low resistance to corrosion, high cost; they cannot provide high strain response and are of heavy weight. These disadvantages are not suitable for some applications such as electroactive actuators. Many researchers have tried to investigate new materials which are of light weight and high electroactive efficiency. Because of light weight, it requires a low power consumption and low voltage; for an example electroactive actuator using cellulose electroactive paper (Sung-Ryul Yun *et.al.,* 2009). However, the actuation performance has been shown to depend on applied electric field.

Conjugated conductive polymers have been widely studied; polyazine is the one conjugated conductive polymer that contains extensive conjugation existing along the polymer backbone and the nitrogen heteroatoms, they are not reactive in air, polyazine can be oxidized into a conducting state (Euler W. B., 1989).

In this work, we are interested to fabricate an electroactive material from permethylpolyazine (PAZ). We will use an ethylene propylene diene rubber (EPDM) as the matrix phase. We will add small amounts of permethylpolyazine (5%-20% volume by volume) as the dispersed phase to improve the electrical properties. Then we will measure the electrical conductivities and the electrorheological properties; storage modulus ($G'(\omega)$) and loss modulus ($G''(\omega)$) under applied electric field and temperature.