THESIS INFORMATION

INTRODUCTION

Thesis title:	**SYNTHESIS AND CHARACTERIZATION OF THERMO-REVERSIBLE SELF-HEALING POLYURETHANE NETWORKS**
Major:	**MATERIAL ENGINEERING**
Major code:	**9520309**
PHD Student:	**TRUONG THU THUY**
Training institute:	**HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY, VIETNAM NATIONAL UNIVERSITY – HOCHIMINH CITY**
Scientific supervisors:	**ASSOC. PROF. DR. NGUYEN THI LE THU**

CONTENT

This thesis describes two main approaches to manufacture networks containing dynamic **Diels–Alder and (thio)urethane bonds and shape recovery ability**. Such materials were capable of **mild-temperature (≤70 °C)**–triggered healing of scratches, complete cuts and deformation damages.

System 1 focuses on PUs containing dynamic DA entities engineered at the interface between the hard and soft domains. This concept of molecular design enables PUs to have great mechanical properties (Young’s modulus ∼80−225 MPa, ultimate tensile strength ∼16−30 MPa, and toughness ∼26−96 MJ m^{-3}) and simultaneously remarkable healing ability at mild temperatures (60−70 °C) of macroscratches, punctures, and complete cuts.

To address the strict synthesis conditions of System 1, **System 2 introduces a straightforward approach with dynamic Diels-Alder and thiourethane bonds dispersed in the PCL semicrystalline phase**. The best obtained material showed high tensile strength (~36 MPa) and Young’s modulus (~ 330 MPa) and good healing efficiency at mild temperature (complete healing of scratches and cuts and tensile strength recovery of 87% at 70 °C).

System 3 builds upon System 2 by blending the crosslinked poly(caprolactone-thiourethane) lattice with a linear P(4VP-SMA) copolymer. The mechanical recovery was 82% when adding 10 wt% of P(4VP-*r*-SMA) after 10 h at 70 °C, indicating an improvement of the healing time compared to the original system.

Scientific supervisors	**PhD Student**
Assoc. Prof. Dr. Nguyen Thi Le Thu	**Truong Thu Thủy**

s