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SYNTHESIS AND CHARACTERIZATION OF ACTIVE FUNCTIONAL COPOLYMERS  
OF *N*-ISOPROPYLACRYLAMIDE

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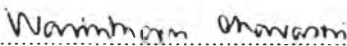
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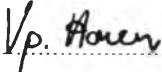
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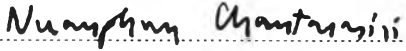
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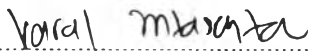
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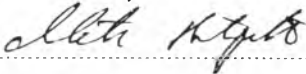
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วิไลพร ไกรสุวรรณ : การสังเคราะห์และการหาลักษณะสมบัติของแอททีฟฟังก์ชันนัล โคพอลิเมอร์ของเอ็น-ไอโซโพรพิลอะคริลาไมด์. (SYNTHESIS AND CHARACTERIZATION OF ACTIVE FUNCTIONAL COPOLYMERS OF N-ISOPROPYLACRYLAMIDE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร.วรวรรีร์ ไฮเว่น, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: ศ. ดร.สุดา เกียรติกำจรวงศ์, 64 หน้า.

สังเคราะห์โคพอลิเมอร์แบบสุ่มและบล็อกที่มีองค์ประกอบของมอนอเมอร์ที่มีแอททีฟเอสเทอร์ (เอ็น-อะคริลอกซีซักซินิไมด์และเพนตะฟลูออโรฟีนิลอะคริเลต) และเอ็น-ไอโซโพรพิลอะคริลาไมด์โดยปฏิกิริยาพอลิเมอไรเซชันแบบรีเวอร์สซิเบิลแอตติวชัน-แฟรกเมนเตชันเซนทรานสเฟอร์ หมู่ว่องไวแสงของโอ-ไนโตรเบนซิล (โอเอ็นบี) ถูกเติมเข้าไปในโครงสร้างของโคพอลิเมอร์ผ่านการดัดแปลงหลังปฏิกิริยาพอลิเมอไรเซชัน โคพอลิเมอร์ที่มีหมู่อีเอ็นบีสามารถเกิดการประกอบตัวเองเป็นไมเซลล์หรือขึ้นรูปเป็นเส้นใยอิเล็กโทรสปินได้ ภายใต้การฉายรังสียูวี หมู่อีเอ็นบีสามารถหลุดออกและเหนี่ยวนำให้เกิดการเชื่อมขวางภายในโดยปฏิกิริยาซึ่งเกิดขึ้นเองกับแอททีฟเอสเทอร์ที่เหลือเกิดเป็นไมเซลล์หรือเส้นใยที่เสถียร ไมเซลล์เชื่อมขวางเป็นทางเลือกสำหรับตัวบรรจุสารประกอบว่องไวภายในไมเซลล์ ซึ่งน่าจะเป็นประโยชน์สำหรับงานทางชีวการแพทย์ นอกจากนี้ผลจากการศึกษาการตอบสนองของเซลล์ในหลอดทดลองแสดงให้เห็นว่าเส้นใยเชื่อมขวางที่ตรึงด้วยจิวาร์จิติเอสน่าจะประยุกต์ใช้เป็นโครงฟุ้งเซลล์สามมิติที่ตอบสนองต่ออุณหภูมิเหมาะสำหรับการประยุกต์ในการการเพาะเลี้ยงเซลล์และวิศวกรรมเนื้อเยื่อ

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WILAIORN GRAISUWAN: SYNTHESIS AND CHARACTERIZATION OF ACTIVE  
FUNCTIONAL COPOLYMERS OF *N*-ISOPROPYLACRYLAMIDE. ADVISOR:  
ASSOC. PROF. VORAVEE P. HOVEN, Ph.D., CO-ADVISOR: PROF. SUDA  
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Well-defined random and block copolymers consisting of active ester-containing monomer (*N*-acryloxysuccinimide, NAS and pentafluorophenyl acrylate, PFFPA) and *N*-isopropylacrylamide (NIPAAm) were synthesized by reversible addition-fragmentation chain transfer polymerization. Light responsive moieties of *o*-nitrobenzyl (ONB) were introduced to the copolymers via post polymerization modification. The ONB-containing copolymers could be successfully self-assembled or fabricated into micelles or electrospun fibers, respectively. Under UV irradiation, the ONB groups can be released, which subsequently induced an *in situ* crosslinking by spontaneous reaction with the remaining active esters and yielded stable cross-linked micelles or fibers. The cross-linked micelles are alternative cargo for incorporating active compounds that may be useful for biomedical applications. Furthermore, results from *in vitro* cytocompatibility studies demonstrated that the GRGDS-immobilized cross-linked fibers may be applicable as thermoresponsive 3D scaffold suitable for cell culture and tissue engineering applications.

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## LIST OF ABBREVIATIONS

AA	: Acrylic acid
AIBN	: Azobisisobutyronitrile
BSA-FITC	: Albumin-fluorescein isothiocyanate conjugate
CPADB	: 4-cyanopentanoic acid dithiobenzoate
DCC	: Dicyclohexylcarbodiimide
FT-IR	: Fourier Transform Infrared Spectroscopy
GPC	: Gel Permeation Chromatography
GRGDS	: H-Gly-Arg-Gly-Asp-Ser-OH
LCST	: Lower critical solution temperature
NAS	: <i>N</i> -acryloxysuccinimide
NHS	: <i>N</i> -hydroxysuccinimide
NIPAAm	: <i>N</i> -isopropylacrylamide
NMR	: Nuclear Magnetic Resonance Spectroscopy
ONB	: <i>ortho</i> -nitrobenzyl
PFPA	: Pentafluorophenyl acrylate
PPFPA	: Poly(pentafluorophenyl acrylate)
PNAS	: Poly( <i>N</i> -acryloxysuccinimide)
PNIPAAm	: Poly( <i>N</i> -isopropylacrylamide)
RAFT	: Reversible addition-fragmentation chain transfer
SEM	: Scanning Electron Microscopy
TEA	: Triethylamine
TEM	: Transmission Electron Microscopy

