

Fabrice DETREZ

Born June 29, 1979 in Paris (France)
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DOCTOR IN MATERIAL SCIENCE AND ENGINEERING
POSTDOCTORAL POSITION IN MATERIAL SCIENCE

SCIENTIFIC INTERESTS

- Solid state polymers
- Microstructure-property relationships
- Mechanical properties of hydrogel polymers
- Computer science

EDUCATION

2008	PhD Thesis at <i>Univ. Lille Nord de France</i> Advisor: Roland SEGUELA
2001-2005	Master's Degree in mechanical engineering <i>E.N.S. Cachan</i> Master's Degree in condensed matter <i>Univ. Lille Nord de France</i>
2002-2004	"Professeur Certifié" in mechanical engineering (Speciality: production), french teaching certification to teach in middle and high school. Eligible candidate for "agregation" of mechanical engineering (2 times)
1998-2001	Bachelor's Degree in mechanical engineering <i>E.N.S. Cachan</i>

ADDITIONAL TRAINING

2009	Biomaterials and tissue engineering , <i>H. Lahreche, L. Auwray</i> (Univ. Evry) Physics and Mechanics of Random Media , <i>D. Jeulin</i> (F2M Paris)
2006	Technical textiles (ENSAIT Roubaix)
2005	Non-linear mechanics of materials , <i>G. De Saxce, M. Brieu</i> (Univ. Lille) Homogenization methods , <i>D. Kondo, M. Brieu</i> (Univ. Lille)

SKILLS

Mechanics	<ul style="list-style-type: none">• Mechanics and thermodynamics of continuous media• Formulation of constitutive mechanical models• Hyperelasticity, Plasticity, Damage, Visco-elasticity and Fatigue• Numerical implementation
Chemical physics of polymer	<ul style="list-style-type: none">• Microstructure characterization (AFM, SEM, SAXS, WAXS)• Thermomechanical characterization (DSC, DMTA, ATG, Optical extensometry)
Computing (Linux, Windows)	<ul style="list-style-type: none">• Finite element method• Computer codes : ZeBuLon, Abaqus, Castem, FEBio, DLPoly• Languages : C++, Fortran, Python, Flash• CAD : Catia, SolidWorks, Inventor
Processes	<ul style="list-style-type: none">• Heat treatments of polymers• Extrusion of polymers and polymer blends• Material forming and assembling processes (machining, foundry, forging, welding)

RESEARCH ACTIVITIES

- 2009-2010 **Post-doctoral internship** Centre Des Matériaux (UMR 7633) - MINES ParisTech - France
KEYWORDS: POLYMER HYDROGEL, FATIGUE, TISSUE ENGINEERING, CRUCIATE LIGAMENT
- 2008-2009 **Research engineer** UMET - Univ. Lille Nord de France - France
KEYWORDS: ATOMIC FORCE MICROSCOPY, NANOINDENTATION, POLYMER COATING
- 2005-2008 **PhD Thesis : “Nano-Scale Deformation Mechanisms in Semi-Crystallin Polymers : In Situ Atomic Force Microscopy Study and Modeling ”** UMET - Univ. Lille Nord de France - France
KEYWORDS: SEMICRYSTALLIN POLYMERS, DAMAGE, PLASTICITY, NANOMECHANISM, AFM
- 2004-2005 **Second Year Master’s degree : “Multi-scale study of plasticity in semicrystallin polymer blends”** UMET - Univ. Lille Nord de France - France
KEYWORDS: SEMICRYSTALLIN POLYMERS, POLYMER BLENDS, MONOCRYSTAL PLASTICITY
- 2002 **First Year Master’s degree : “Conception of the educational software DIAMANT in mechanical manufacturing”** Polytechnique de Montréal - Canada
KEYWORDS: MACHINING, WELDING, STAMPING

TEACHING ACTIVITIES

- 2010 **Solid Material Mechanics Project** MINES ParisTech - France
KEYWORDS: CREEP OF METALS, ANISOTROPIC ELASTICITY OF COMPOSITES, COMPRESSION OF GRANULAR MATERIALS
- 2009-2010 **Finite Element Project** MINES ParisTech - France
KEYWORDS: THERMOELASTICITY, CONTACT MECHANICS, ZÉBULOÑ
- 2005-2008 **Undergraduate Teaching Assistants** Univ. Lille Nord de France - IUT A - France
- **Lectures** General Mechanics
 - **Lectures** Mechanical Technology
 - **Practical classe** CAD
 - **Practical classe** Metrology
- 2003 **Undergraduate oral examiner in mechanical engineering** Lycée Janson de Sailly - Paris - France
Keywords: General mechanics, Automatism

POSITIONS

- 2006-2008 **Volunteer in “Physique Itinérante” association** Lille - France
KEYWORDS: PROMOTION OF THE PHYSICS, SPETACULAR EXPERIMENTS, HIGH SCHOOL

SUPERVISING ACTIVITIES

- 2007 **First Year Masters’ project “Study of poly(ϵ -caprolactone) and polycarbonate blends”** . UMET/Polytech’Lille - Univ. Lille Nord de France - France
KEYWORDS: POLYMER BLENDS, THERMOMECHANICAL ANALYSIS, EXTRUSION

REFERENCES

- Roland SÉGUÉLA** *Professor - UMET - Univ. Lille Nord de France - France*
roland.seguela@univ-lille1.fr
- Sabine CANTOURNET** *Associate Professor - Centre des Matériaux - MINES ParisTech- France*
sabine.cantournet@mines-paristech.fr

Refereed journal publications

1. F. Detrez, S. Cantournet, R. Séguela. *Plasticity/damage coupling in semi-crystalline polymers: micromechanisms and damage law identification*. **Polymer** (Submit)
2. F. Detrez, S. Cantournet, R. Séguela. *A constitutive model for semi-crystalline polymer deformation involving lamellar fragmentation*. **Comptes rendus Mécanique** Volume 338, Pages 681–687, 2010.
3. F.R. Baxter, J.S. Bach, F. Detrez, S. Cantournet, L. Corté, M. Cherkaoui, D.N. Ku *Augmentation of bone tunnel healing in anterior cruciate ligament grafts: application of calcium phosphates and other materials*. **Journal of Tissue Engineering**
4. C. Thomas, R. Séguela, F. Detrez, V. Miri, C. Vanmansart. *Plastic deformation of spherulitic semi-crystalline polymers: An in situ AFM study of polybutene under tensile drawing*. **Polymer**, Volume 50, Pages 3714-3723, 2009.

Patents

1. F. Detrez, S. Cantournet, L. Corté, D. Ku, M. Cherkahoui, F. Baxter, J. Bach. *Protheses of anterior cruciate ligament*

Refereed conference proceedings

1. F. Detrez, S. Cantournet, R. Séguela. *Couplage plasticité endommagement dans les polymères semi-cristallins induit par fragmentation*. **Colloque Matériaux 2010**. Nantes (France) 2010
2. F. Detrez, S. Cantournet, R. Séguela. *Introduction du mécanisme de fragmentation dans la modélisation des polymères semicristallins*. **Colloque DEPOS XXIII**. Guidel-Plage (France) 2010
3. F. Detrez, S. Cantournet, M. Cherkaoui, D. N. Ku, L. Corté, *Fatigue of hydrogel fibers*. **Macro2010: 43rd IUPAC World Polymer Congress**. Glasgow (United Kingdom) 2010
4. F. Detrez, R. Séguela, S. Cantournet. *Quantification et modélisation du couplage plasticité endommagement dans les polymères semicristallins à morphologie sphérolitique*. **19^e Congrès National de la Société Française de Mécanique**. Marseille (France) 2009
5. F. Detrez, S. Cantournet, R. Séguela, G. Coulon. *Nano scale deformation mechanisms in semi-crystalline polymer: in situ atomic force microscopy study and modelling*. **Symposium Materials Science & Technology**. Pittsburgh, Pennsylvania (USA) 2008
6. F. Detrez, R. Séguela, G. Coulon. *Relation entre le comportement mécanique et la structure des polymères semi-cristallins*. **Colloque Plasticité 2008**. Nancy (France) 2008
7. F. Detrez, R. Séguela, G. Coulon. *Étude multi-échelle de la déformation des polymères semi-cristallins: approche expérimentale par microscopie à force atomique de la polycaprolactone et du polybutène 1*. **Colloque DEPOS XXI**. Villeneuve d'Ascq (France) 2007
8. F. Detrez, R. Séguela, G. Coulon. *Etude des mécanismes de déformation d'un polymère semi-cristallin: le poly(ϵ -caprolactone)*. **18^e Congrès National de la Société Française de Mécanique**. Grenoble (France) 2007
9. F. Detrez, V. Ferreiro, G. Coulon. *Étude par MFA des nanomécanismes de déformation plastique dans des systèmes polymériques modèles à base de polycaprolactone*. **Colloque DEPOS XX**. Obernai (France) 2006
10. F. Detrez, M. Lebœuf, V. Ferreiro, G. Coulon. *Étude par MFA des nanomécanismes de déformation plastique dans des systèmes polymériques modèles à base de polycaprolactone*. **Forum de microscopies à sondes locale**. Anglet (France) 2005

Non-refereed conference proceedings and other publications

1. F. Detrez, S. Cantournet, R. Séguéla. *Couplage endommagement plastique dans les polymères semi-cristallins*. **Centres des Matériaux, Mines ParisTech**. Evry (France) 2010
2. F. Detrez, S. Cantournet, L. Corté, D. Ku, M. Cherkahoui, F. Baxter, J. Bach. *Caractérisation mécanique d'une prothèse ligament croisé antérieur*. **CEMEF, Mines ParisTech**. Sophia-Antipolis (France) 2010
3. F. Detrez, S. Cantournet, L. Corté, D. Ku, M. Cherkahoui, F. Baxter, J. Bach. *Fabrication d'une prothèse de ligament croisé antérieur*. **CEMEF, Mines ParisTech**. Sophia-Antipolis (France) 2009
4. F. Detrez *Nanomécanismes de Déformation des Polymères Semi-Cristallins: Etude In situ par Microscopie à Force Atomique et Modélisation*. **PhD thesis manuscript**. Univ Nord de France. Lille. 2008
5. F. Detrez, R. Séguéla, G. Coulon. *Mise en évidence de l'endommagement dans les polymères semi-cristallins*. **1^{re} Journée des jeunes polyméristes du Nord**. Villeneuve d'Ascq (France). 2007.