

# JAN-ANDERS MANSSON Distinguished Professor » jmansson@purdue.edu » 765.494.8244

Following five years in Industry as CTO Mansson moved in 1985 to an academic position at the University of Washington, Seattle. In 1990, he joined the Ecole Polytechnique Fédérale de Lausanne (EPFL) as Professor and Director of a newly created chair in Polymer and Composite Technology (LTC) at the Institute of Materials. His research interests are primarily in Composite manufacturing, covering topics such as:

- » Processes & Materials for “High-Volume” Composites
- » Hybrid Molding for Complex Shape Molding
- » Functional Material-Forms
- » Technical Cost Modeling & Implementation Strategies

Besides his research, Prof. Manson was during a period Vice-president at the Ecole Polytechnique Fédérale de Lausanne, focusing on Innovation and Technology Transfer. Since 2008, Prof. Mansson is besides his University engagement, President of the International Academy of Sports Science and Technology, AISTS, an International Olympic Committee (IOC) co-founded organization linking Academic Institutions in Sport Management and Technology.

Prof. Mansson is the founder of the composite companies, EELCEE Ltd. and QEESTAR Co. Ltd. (JV) active in the field of High-Volume Composites and Additive Manufacturing. The two companies have today its main operation in Korea and Europe.



## Current Research Focus

The research is focused on novel cost-effective materials and manufacturing methods as well as unique additional functionalities, beyond the classical performance characteristics of composite materials. The research involved both process and material specific topics but most importantly the interaction between material and process specific characteristics. In addition are scaling strategies for implementation in industrial context emphasized. The research partners are in the Automotive, Aerospace, Chemical, Medical and Sport industries.

## Main Research Themes

### EFFICIENT MASS PRODUCTION OF COMPOSITES

- » Process integration
- » High-rate processes
- » Complex shape forming

### INCREASED FUNCTIONALITY OF COMPOSITES

- » Material-form hybridization
- » Integrated Sensing & Monitoring
- » Adaptive composites

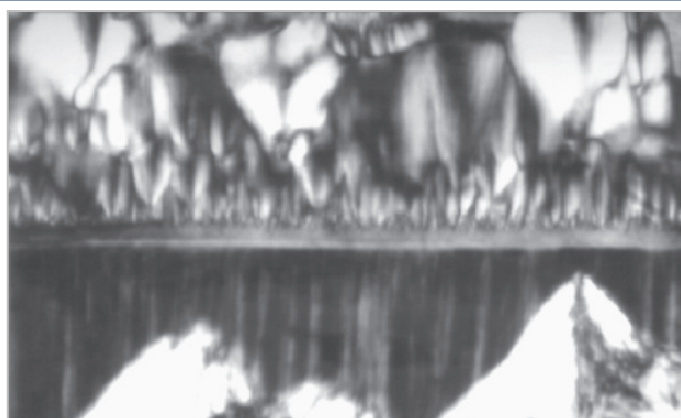
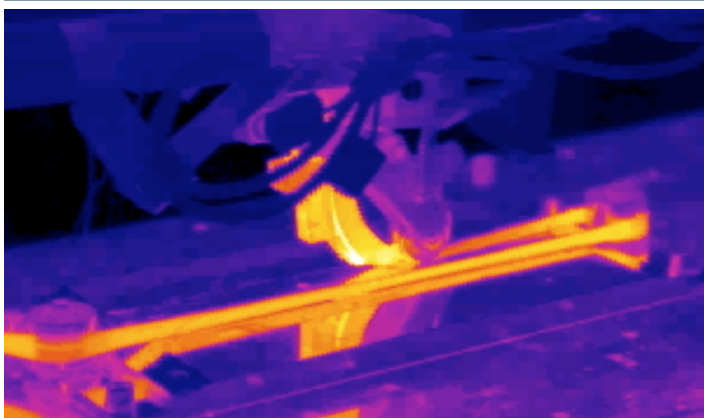
### COST-EFFECTIVE HIGH-VOLUME COMPOSITE MANUFACTURING

- » Tailored material-form designs
- » Material/Process hybridization
- » Adaptive manufacturing lines
- » Technical Cost Modeling
- » Life Cycle Engineering (LCA & LCC)

## Recent Publications

- Dalle Vacche S., Oliveira F., Leterrier Y., Michaud V., Damjanovic D., Månson J.-A.E. (2014) Effect of Silane Coupling Agent on the Morphology, Structure and Properties of Poly(Vinylidene Fluoride – Trifluoroethylene)/BaTiO<sub>3</sub> Composites, *Journal of Materials Science*, 49, 4552-4564.
- Duc F., P.E. Bourban, C.J.G. Plummer, J.-A.E. Månson (2014). “Damping of thermoset and thermoplastic flax fibre composites.” *Composites Part A-Applied Science and Manufacturing* 64: 115-123.
- Duc, F., P. E. Bourban, J.-A.E. Månson (2014). “Dynamic mechanical properties of epoxy/ flax fibre composites.” *Journal of Reinforced Plastics and Composites* 33(17): 1625-1633.
- Duc, F., P. E. Bourban, J.-A.E. Månson (2014). “The role of twist and crimp on the vibration behaviour of flax fibre composites.” *Composites Science and Technology*, 102(6): 94-99.

## Figures



## Publications

- Galland S., Leterrier Y., Nardi T., Plummer C.J.G., Månson J.-A.E., Berglund L.A., UV-Cured Cellulose Nanofiber Composites with Moisture Durable Oxygen Barrier Properties, *Journal of Applied Polymer Science*, 131, 40604 (2014).
- S. S. Glock, X.X. Zhang, N.J. Kucza, P. Müllner and V. Michaud (2014) Structural, physical and damping properties of melt-spun Ni-Mn-Ga wire-epoxy composites, *Composites Part A* 63, 68–75.
- Nardi T., Leterrier Y., Månson J.-A.E. (2014) Bioinspired Functionally Graded Nanocomposites Synthesized Through Magnetophoretic Processes for Tailored Stress Reduction, *MRS Proceedings*, 1685.
- Nardi, T., Leterrier, Y., Karimi, A. & Månson, J.A.E. (2014) A novel synthetic strategy for bioinspired functionally graded nanocomposites employing magnetic field gradients. *RSC Advances*, 4 (14), 7246-7255.
- Oliveira, F., Leterrier, Y., Månson, J.A., Sereda, O., Neels, A., Dommann, A. & Damjanovic, D. (2014) Process influences on the structure, piezoelectric, and gas-barrier properties of PVDF-TrFE copolymer. *Journal of Polymer Science Part B-Polymer Physics*, 52 (7), 496-506.
- M. Schmocker; A. Khoushabi; B. Gantenbein-Ritter; S. Chan; H.M. Boné; P.E. Bourban; J.A.E. Månson; C. Schizas; D. Pioletti; C. Moser (2014). "Minimally Invasive Photopolymerization in Intervertebral Disc Tissue Cavities." *Proceeding of the SPIE 8952 Biomedical Applications of Light Scattering VIII*.
- M. Soutrenon, V. Michaud and J.A.E Månson (2014) Energy dissipation in concentrated monodisperse colloidal suspensions of silica particles in polyethylene glycol, *Colloids and Polymer Science*, 292, 3291-3299.
- Velut, P., R. Tween, R. Teuscher, Y. Leterrier, J.-A. E. Månson, F. Galliano and D. Fischer (2014). "Conformal Thin Film Silicon Photovoltaic Modules." *International Journal of Sustainable Energy*. 33, 783-796.
- Verpoest, I.; Lomov, S.; Swolfs, Y.; Jacquet, P.; Michaud, V.; Månson, J.-A.; Hobdell, J.; Hine, P.; Marquette, P.; Herten, H. (2014) *Advanced Materials Enabling High-Volume Road Transport Applications of Lightweight Structural Composite Parts*, *SAMPE Journal*, 50(3) 30-37.
- Yoon, Y.H., Plummer, C.J.G., Thoemen, H., Månson, J.-A.E. (2014) "Liquid CO<sub>2</sub> processing of solid polylactide foam precursors". *Journal of Cellular Plastics*, 1-22.
- Plummer, C.J.G., Yoon, Y.H., Garin, L., Månson, J.-A.E. (2015), Crystallization of polylactide during impregnation with liquid CO<sub>2</sub>, *Polymer Bulletin*, 72 (1), 103-116.
- González Lazo M.A., Schüler A., Haug F.-J., Ballif C., Månson J.-A.E., Leterrier Y. (2015) Superhard Antireflective Textures Based on Hyperbranched Polymer Composite Hybrids for Thin Film Solar Cells Encapsulation, *Energy Technology*, 3, 366–372.
- Plummer, C.J.G., Galland, S., Ansari, F., Leterrier, Y., Bourban, P.E., Berglund, L.A. & Månson, J.A.E. (2015) Influence of processing routes on morphology and low strain stiffness of polymer/nanofibrillated cellulose composites. *Plastics Rubber and Composites*, 44 (3), 81-86.
- Dalle Vacche, S., Leterrier, Y., Michaud, V., Damjanovic, D., Aebersold, A.B. & Månson, J.A.E. (2015) Effect of interfacial interactions on the electromechanical response of poly(vinylidene fluoride-trifluoroethylene)/BaTiO<sub>3</sub> composites and its time dependence after poling. *Composites Science and Technology*, 114, 103-109.
- Khoushabi A., Schmocker A., Pioletti D.P., Moser C., Schizas C., Månson J.A. E., Bourban, P. E., Photo-polymerization, swelling and mechanical properties of cellulose fibre reinforced poly(ethylene glycol) hydrogels. *Composites Science and Technology*. 2015;119:93-9.
- Yoon Y., Plummer C.J.G., Månson J.-A.E. Solid heat-expandable polylactide-poly(methyl methacrylate) foam precursors prepared by immersion in liquid carbon dioxide. *Journal of Materials Science*. 2015;50:7208-17.
- Nardi T., Canal L.P., Hausmann M., Dujonc F., Michaud V., Månson J.-A.E., Leterrier, Y. Stress reduction mechanisms during photopolymerization of functionally graded polymer nanocomposite coatings. *Progress in Organic Coatings*. 2015; 87:204-12.
- Nardi T., Hammerquist C., Nairn J.A., Karimi A., Månson J.-A.E., Leterrier Y., Nanoindentation of Functionally Graded Polymer Nanocomposites: Assessment of the Strengthening Parameters through Experiments and Modeling, *Front. Mater.* 2:57 (2015).
- Khoushabi, A. Schmocker, D. Pioletti, C. Moser, C. Schizas, J.-A.E. Månson, P.-E Bourban, Photopolymerization, swelling and mechanical properties of cellulose fibre reinforced polyethylene glycol hydrogels, *Composites Science and Technology*, 119 (2015) 93-99

## Recent Patents &amp; Patent Applications

- » Self-monitoring composite vessel for high pressure media
- » High pressure media storage vessel comprises a wall made of a layer with barrier and piezoelectric properties and has self-sensing capability
- » Dual cure compositions, related hybrid nanocomposite materials and dual cure process for producing same
- » Electrochemical cell (Collecteurs de courant ultra-flexibles et imperméables)
- » Structures with Shear thickening fluids
- » Composite Hydrogels
- » Biocompatible multi-layered structure comprising foam layers and a functional interface