

## List of Publications

**Dr. Andreas Pfrang, Institute for Energy and Transport, Joint Research Centre, European Commission, Petten, Netherlands**

### Publications in peer reviewed journals

- A. Pfrang, D. Veyret, G. Janssen, G. Tsotridis. *Imaging of membrane electrode assemblies of proton exchange membrane fuel cells by X-ray computed tomography*. Journal of Power Sources 2011, 196(12), 5272-5276
- A. Pitois, A. Pilenga, A. Pfrang, G. Tsotridis. *Temperature-dependent CO desorption kinetics on supported gold nanoparticles: Relevance to clean hydrogen production and fuel cell systems*. International Journal of Hydrogen Energy 2011, 36(7), 4375-4385
- A. Pfrang, D. Veyret, F. Sieker, G. Tsotridis. *X-ray computed tomography of gas diffusion layers of PEM fuel cells: Calculation of thermal conductivity*. International Journal of Hydrogen Energy 2010, 35(8), 3751-3757
- A. Pitois, A. Pilenga, A. Pfrang, G. Tsotridis, B. Abrams, L.B. Chorkendorff. *Temperature dependence of CO desorption kinetics at a novel Pt-on-Au/C PEM fuel cell anode*. Chemical Engineering Journal 2010, 162(1), 314-321
- A. Pfrang, Y.Z. Wan, Th. Schimmel. *Early stages of the chemical vapor deposition of pyrolytic carbon investigated by atomic force microscopy*. Carbon 2010, 48(3), 921-923
- A. Pitois, J.C. Davies, A. Pilenga, A. Pfrang, G. Tsotridis. *Kinetic study of CO desorption from Pt/Pu PEM fuel cell anodes: Temperature dependence and associated microstructural transformations*. Journal of Catalysis 265 (2009), 199-208.
- IE best peer-reviewed scientific paper award 2009, Institute for Energy of the Joint Research Centre of the European Commission**  
**2009 JRC Excellence award for the best peer-reviewed scientific paper, Joint Research Centre of the European Commission**
- G.J.M. Janssen, E.F. Sitters, A. Pfrang. *Proton-exchange-membrane fuel cells durability evaluated by load-on/off cycling*. Journal of Power Sources 191 (2009), 501-509.
- N. Deyneka-Dupriez, U. Herr, H-J. Fecht, A. Pfrang, Th. Schimmel, B. Reznik, D. Gerthsen. *Interfacial adhesion and friction of pyrolytic carbon thin films on silicon substrates*. Journal of Materials Research 23 (2008), 2749-2756.
- A. Pfrang, K. Schladitz, A. Wiegmann, Th. Schimmel. *Calculation of the evolution of surface area and free volume during the infiltration of fiber felts*. Chemical Vapor Deposition 13 (2007), 705-715.
- B. J. Mullins, A. Pfrang, R.D. Braddock, Th. Schimmel, G. Kasper. *Detachment of liquid droplets from fibres – experimental and theoretical evaluation of detachment force due to interfacial tension effects*. Journal of Colloid and Interface Science 312 (2007), 333-340.
- C.G. Poulton, C. Koos, M. Fujii, A. Pfrang, Th. Schimmel, J. Leuthold, W. Freude. *Radiation modes and roughness loss in high index-contrast waveguides*. IEEE Journal of Selected Topics in Quantum Electronics 12; Special Issue on Nanophotonics (2006), 1306-1321.
- V. De Pauw, A. Collin, W. Send, J. Hawecker, D. Gerthsen, A. Pfrang, Th. Schimmel. *Deposition rates during the early stages of pyrolytic carbon deposition in a hot-wall reactor and the development of texture*. Carbon 44 (2006), 3091-3101.
- W. Freude, C.G. Poulton, C. Koos, J. Brosi, M. Fujii, A. Pfrang, Th. Schimmel, M. Müller, J. Leuthold. *Nanostrip and photonic crystal waveguides: the modelling of imperfections*. Proc. 15th International Workshop on Optical Waveguide Theory and Numerical Modelling (OWTNNM'06), Varese, Italy, April 20–21, (2006), 1–2, invited paper.

W. Freude, C. Poulton, C. Koos, J. Brosi, M. Fujii, M. Müller, J. Leuthold, A. Pfrang, Th. Schimmel. *Nano-optical waveguide devices with random deformations and nonlinearities*. Conference Digest of the 3rd International Conference on Materials for Advanced Technologies (ICMAT'05), Symposium F: Nano-Optics and Microsystems, Singapore, July 3–8, (2005), invited paper.

A. Pfrang. *Von den Frühstadien der Pyrokohlenstoffabscheidung bis zum Kompositwerkstoff - Untersuchungen mit Rastersondenverfahren*. Dissertation, Verlag Dr. Hut, München (2005).

M. Kiderlen, A. Pfrang. *Algorithms to estimate the rose of directions of a spatial fiber system*. Journal of Microscopy 219 (2005), 50-60.

A. Pfrang, B. Reznik, Th. Schimmel, D. Gerthsen. *Microstructure analysis of a carbon-carbon composite using argon ion etching*. Microscopy and Microanalysis 11 (2005), 46-55.

A. Pfrang, Th. Schimmel. *Quantitative analysis of pyrolytic carbon films by polarized light microscopy*. Surface and Interface Analysis 36 (2004), 184-188.

E.G. Bortchagovsky, B. Reznik, D. Gerthsen, A. Pfrang, Th. Schimmel. *Optical properties of pyrolytic carbon deposits deduced from measurements of the extinction angle by polarized light microscopy*. Carbon 41 (2003), 2430-2433.

A. Pfrang, B. Reznik, Th. Schimmel, D. Gerthsen. *Comparative study of differently textured pyrolytic carbon layers by atomic force, transmission electron and polarized light microscopy*. Carbon 41 (2003), 181-185.

A. Pfrang, K.J. Hüttinger, Th. Schimmel. *Adhesion imaging of carbon fiber reinforced materials in the pulsed force mode of the AFM*. Surface and Interface Analysis 33 (2002), 96-99.

## Publications at international conferences or workshops

A. Pfrang, D. Veyret, G. Tsotridis. *X-ray computed tomography of gas diffusion layers and membrane electrode assemblies of PEM fuel cells*. Microscopy Conference 2011, Kiel, Germany, 2011.

A. Pfrang, D. Veyret, G. Tsotridis, G. Janssen. *X-ray computed tomography of PEM fuel cells*. International Conference on Materials for Energy, Karlsruhe, Germany, 2010.

A. Pfrang, A. Pitois, A. Pilenga, G. Tsotridis. *Investigation of PEM fuel cell electrodes by transmission electron microscopy, scanning electron microscopy and x-ray diffraction*. International Conference on Materials for Energy, Karlsruhe, Germany, 2010.

A. Pfrang, D. Veyret, G. Tsotridis. *Investigation of gas diffusion layers of PEM fuel cells by x-ray computed tomography*. Ulm ElectroChemical Talks 2010, Ulm, Germany, 2010.

D. Veyret, A. Pfrang, G. Tsotridis. *Modeling of PEMFC*. IEA (International Energy Agency) Annex 22 - Spring workshop, Petten, Netherlands, 2010.

A. Pfrang, A. Pitois, D. Veyret, G. Janssen. *Micro- and nanostructure analysis of PEM fuel cell components*. IEA (International Energy Agency) Annex 22 - Spring workshop, Petten, Netherlands, 2010.

A. Pfrang, A. Pitois, G. Tsotridis, G.J.M. Janssen, E.F. Sitters, J.A.Z. Pieterse. *Investigation of supported catalyst nanoparticles by transmission electron microscopy*, Microscopy Conference 2009, Graz, Austria, 2009.

A. Pfrang, D. Veyret. *Microstructure analysis and calculation of thermal conductivity of gas diffusion layers of PEM fuel cells*. European Fuel Cell Forum 2009, Luzern, Switzerland, 2009.

- J.A.Z. Pieterse, J.W. Dijkstra, J. Boon, Y.C. van Delft, A. Pfrang, M. Ligthart, E.J.M. Hensen, R.W. van den Brink. *Steam reforming in membrane reactors using nickel catalysts*. 21st North American Catalysis Society Meeting (NAM), San Francisco, USA, 2009.
- A. Pfrang, R. Ermel, E. Kerscher, T. Beck, Th. Schimmel. *Quantitative measurement of fiber pull-out by laser scanning confocal microscopy*. Workshop on Mechanical Testing for Next Generation Nuclear Systems, Petten, Netherlands, 2008.
- S. Walheim, M. Barczewski, R. Gröger, M. Müller, A. Pfrang, B. Riedel, Ch. Obermair, Th. Koch und Th. Schimmel. *Chemical patterning and chemical contrast imaging with the tip of an atomic force microscope*. Nano 2007, Chisinau, Moldova, 2007.
- S. Walheim, M. Barczewski, R. Gröger, M. Müller, A. Pfrang, B. Riedel, Ch. Obermair, Th. Koch und Th. Schimmel. *Chemical patterning and chemical contrast imaging with the tip of an atomic force microscope*. EMRS Fall Meeting, Warsaw, Poland, 2007.
- A. Pfrang, Th. Schimmel. *Pyrolytic carbon surfaces investigated by atomic force microscopy*. Carbon 2006, Aberdeen, Scotland, 2006.
- A. Pfrang, V. DePauw, M. Guellali, R. Oberacker, M. Hoffmann, D. Gerthsen, Th. Schimmel. *Texture analysis of pyrolytic carbon by polarized light microscopy, x-ray diffraction and selected area electron diffraction: A quantitative model*. Carbon 2006, Aberdeen, Scotland, 2006.
- A. Pfrang, R. Ermel, T. Beck, E. Kerscher, M. Müller, C. Ziebert, S. Ulrich, Th. Schimmel. *Mechanical properties of pyrolytic carbon analyzed by nanoindentation, atomic force microscopy and laser scanning confocal microscopy*. Carbon 2006, Aberdeen, Scotland, 2006.
- A. Li, O. Deutschmann, A. Pfrang, Th. Schimmel. *Transient 2D simulation of CVI of methane using multi-step deposition and hydrogen inhibition models*. Carbon 2006, Aberdeen, Scotland, 2006.
- A. Pfrang, D. Bach, D. Gerthsen, Th. Schimmel. *Texture characterization of pyrolytic carbon layers: a quantitative study by polarized light microscopy and selected area electron diffraction*. Spring Meeting of the European Physical Society, Dresden, 2006.
- A. Pfrang, Y.Z. Wan, Th. Schimmel. *Direct observation of intermediate phases of pyrolytic carbon by atomic force microscopy*. Spring Meeting of the European Physical Society, Dresden, 2006.
- A. Pfrang, K. Schladitz, A. Wiegmann, Th. Schimmel. *Calculation of the evolution of surface area and free volume during the infiltration of fiber felts*. Spring Meeting of the European Physical Society, Dresden, 2006.
- C.G. Poulton, C. Koos, M. Fujii, A. Pfrang, Th. Schimmel, J. Leuthold, W. Freude. *Roughness in high index-contrast waveguides*. COST ("European Cooperation in the Field of Scientific and Technical Research") P11, Twente, Niederlande, 2005.
- A. Pfrang, Th. Schimmel. *Pyrolytic carbon coated stents investigated by atomic force microscopy*. Frontiers Annual Meeting, Karlsruhe, 2005.
- A. Pfrang, Y.Z. Wan, Th. Schimmel. *Pyrolytic carbon coatings for medical applications investigated by atomic force microscopy*. CFN Summer School Nano-Biology, Bad Herrenalb, 2005.
- W. Freude, C. Poulton, C. Koos, J. Brosi, M. Fujii, M. Müller, J. Leuthold, A. Pfrang, Th. Schimmel. *Nano-optical waveguide devices with random deformations and nonlinearities*. Invited talk, 3rd International Conference on Materials for Advanced Technologies (ICMAT 2005), Singapore, 2005.
- A. Pfrang, Y.Z. Wan, Th. Schimmel. *Direct observation of intermediate phases of pyrolytic carbon by atomic force microscopy*. Carbon 2005, Gyeongju, Korea, 2005.
- Best Poster Award**
- A. Pfrang, K. Schladitz, A. Wiegmann, Th. Schimmel. *Calculation of the evolution of surface area and free volume during the infiltration of fiber felts*. Carbon 2005, Gyeongju, Korea, 2005.

- A. Pfrang, D. Bach, D. Gerthsen, Th. Schimmel. *Texture analysis of pyrolytic carbon by polarized light microscopy and selected area electron diffraction: A quantitative model for the correlation between extinction angle and orientation angle*. Carbon 2005, Gyeongju, Korea, 2005.
- V. De Pauw, A. Collin, W. Send, D. Gerthsen, A. Pfrang, Th. Schimmel. *Early stages of pyrolytic carbon deposition*. EMC 2004: 13th European Microscopy Congress, Antwerpen, Belgium, 2004.
- V. De Pauw, A. Collin, W. Send, D. Gerthsen, A. Pfrang, Th. Schimmel. *Microscopic investigations of pyrolytic carbon islands deposited on silicon substrates*. Carbon 2004, Providence, USA, 2004.
- A. Pfrang, Th. Schimmel. *Intermediate phases of pyrolytic carbon observed by atomic force microscopy*. Carbon 2004, Providence, USA, 2004.
- A. Pfrang, Y.Z. Wan, V. De Pauw, W. Send, D. Gerthsen, Th. Schimmel. *Early stages of the chemical vapor deposition of pyrolytic carbon investigated by atomic force microscopy*. Carbon 2004, Providence, USA, 2004.
- A. Pfrang, Th. Schimmel. *Quantitative analysis of pyrolytic carbon by polarized light microscopy*. Carbon 2004, Providence, USA, 2004.
- A. Pfrang, B. Reznik, Th. Schimmel, D. Gerthsen. *Microstructure analysis of a carbon-carbon composite using argon ion etching*. Carbon 2004, Providence, USA, 2004.
- A. Pfrang, Y.Z. Wan, Th. Schimmel. *Investigation of the early stages of the chemical vapor deposition of pyrolytic carbon by atomic force microscopy*. Nano 2004, 7<sup>th</sup> International Conference on Nanostructured Materials, Wiesbaden, 2004.
- V. De Pauw, A. Collin, W. Send, D. Gerthsen, A. Pfrang, Th. Schimmel. *Early stages of pyrolytic carbon deposition on planar substrates in a hot-wall reactor*. Carbon 2003, Oviedo, Spanien, 2003.
- A. Pfrang, B. Reznik, D. Gerthsen, Th. Schimmel. *A comparative study of pyrocarbon microstructure by atomic force, transmission electron and polarized light microscopy*. Carbon 2002, Peking, China, 2002.
- A. Pfrang, I. Yalman, H. Gliemann, K.J. Hüttinger, Th. Schimmel. *Investigation of chemical vapor infiltrated carbon fiber felts by combined scanning force techniques*. Carbon 2002, Peking, China, 2002.
- A. Pfrang, B. Reznik, D. Gerthsen, Th. Schimmel. *Comparative study of pyrocarbon microstructure by atomic force, transmission electron and polarized light microscopy*. Deutsch-Chinesischer Workshop, "Fundamentals and Application of Nano Science: Building Blocks, Modeling and Structuring", Karlsruhe, 2002.
- A. Pfrang, I. Yalman, Th. Schimmel. *Tribological and adhesive properties of carbon/carbon composites on a microscopic scale investigated by scanning force techniques*. Deutsch-Chinesischer Workshop, "Fundamentals and Application of Nano Science: Building Blocks, Modeling and Structuring", Karlsruhe, 2002.
- A. Pfrang, W. Send, D. Gerthsen, Th. Schimmel. *Growth, adhesion and wear of pyrolytic carbon thin films studied on the nanometer scale*. Deutsch-Chinesischer Workshop, "Fundamentals and Application of Nano Science: Building Blocks, Modeling and Structuring", Karlsruhe, 2002.
- A. Pfrang, I. Yalman, Th. Schimmel. *Tribological and adhesive properties of carbon/carbon composites on a microscopic scale investigated by scanning force techniques*. Heraeus Seminar Integrating Friction and Wear Research, Ilmenau, 2002.
- A. Pfrang, W. Send, D. Gerthsen, Th. Schimmel. *Growth, adhesion and wear of pyrolytic carbon thin films studied on the nanometer scale*. Heraeus Seminar Integrating Friction and Wear Research, Ilmenau, 2002.

V. De Pauw, A. Collin, W. Send, D. Gerthsen, A. Pfrang, Th. Schimmel. *Early stages of pyrocarbon deposition on plane substrates in a hot wall reactor*. Journées Scientifiques du GFEC (Groupe Français d'Étude des Carbones), Autrans, Frankreich, 2002.

A. Pfrang, H. Gliemann, Th. Schimmel. *Infiltrated carbon fiber felts investigated by AFM*. Internationaler Workshop, "Characterization and Development of Nanosystems", Peking, China, 2000.

A. Pfrang, U. Sutter, W. Send, D. Gerthsen, Th. Schimmel. *Nanometer-scale wear and adhesion of pyrolytic carbon layers investigated by scanning force techniques*. Internationaler Workshop, "Characterization and Development of Nanosystems", Peking, China, 2000.

A. Pfrang, H. Gliemann, Th. Schimmel. *Infiltrated carbon fiber felts investigated by AFM*. SXM4, Münster, 2000.

A. Pfrang, U. Sutter, W. Send, D. Gerthsen, Th. Schimmel. *Adhesion and wear of pyrolytic carbon layers investigated by atomic force microscopy*. SXM4, Münster, 2000.

A. Pfrang, U. Sutter, W. Send, D. Gerthsen, Th. Schimmel. *Adhesion and wear of pyrolytic carbon layers investigated by atomic force microscopy*. NATO Advanced Study Institute, Fundamentals of and bridging the gap between macro- and micro/nano tribology, Keszthely, Ungarn, 2000.

A. Pfrang, W. Send, D. Gerthsen, Th. Schimmel. *Chemical vapor deposited carbon: adhesion and wear on the nanometer scale studied by AFM*. Internationaler Workshop, "Nanoscience and Technology", Zichron, Israel, 2000.