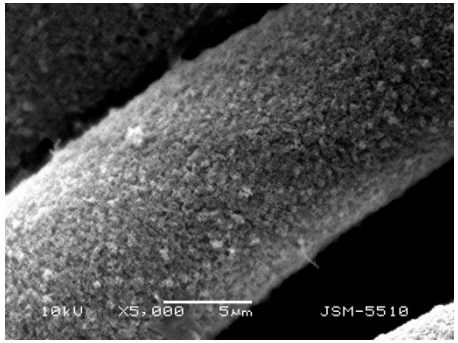
UNIVERSITY OF TWENTE.

EFSM
ENGINEERING OF FIBROUS SMART MATERIALS

Research Team name: **UT-EFSM**
Presenter name: **Victoria Dutschk**

Inkjet printed conductive lines

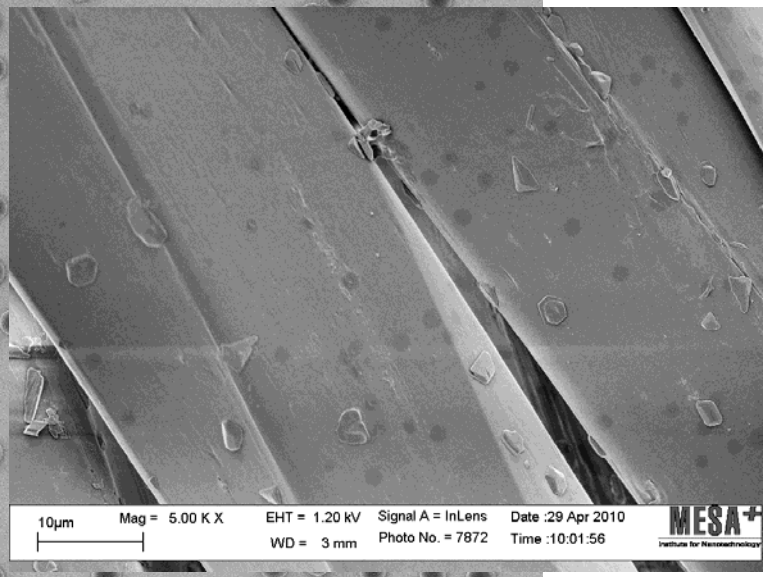



$TiO_2$ nanoparticles on PES fibre

Team Presentation – Annual Workshop, COST Action MP1106
Dublin, September, 2012

**Research Team Name: UT-EFSM**
**Number of team members: 9**

**1 associate professor**
**1 post doc**
**1 technical assistant**
**2 PhD students**
**2 undergraduate students**
**2 undergraduate exchange students**




1µm
Mag = 10.00 K X
EHT = 3.00 kV
WD = 4 mm
Signal A = InLens
Photo No. = 2310
Date :12 Nov 2009
Time :12:07:14
MESA+
Institute for Nanotechnology

Research interests related to **MP1106**:

- Developing of inks, containing dyes and nanoparticles with some new functionalities for textile materials
- Inkjet printing as a process, i.e.

- drop-substrate interactions

-inks properties: colloidal stability, adjustment of surface tension and rheological properties

- Organic electronics for smart textiles

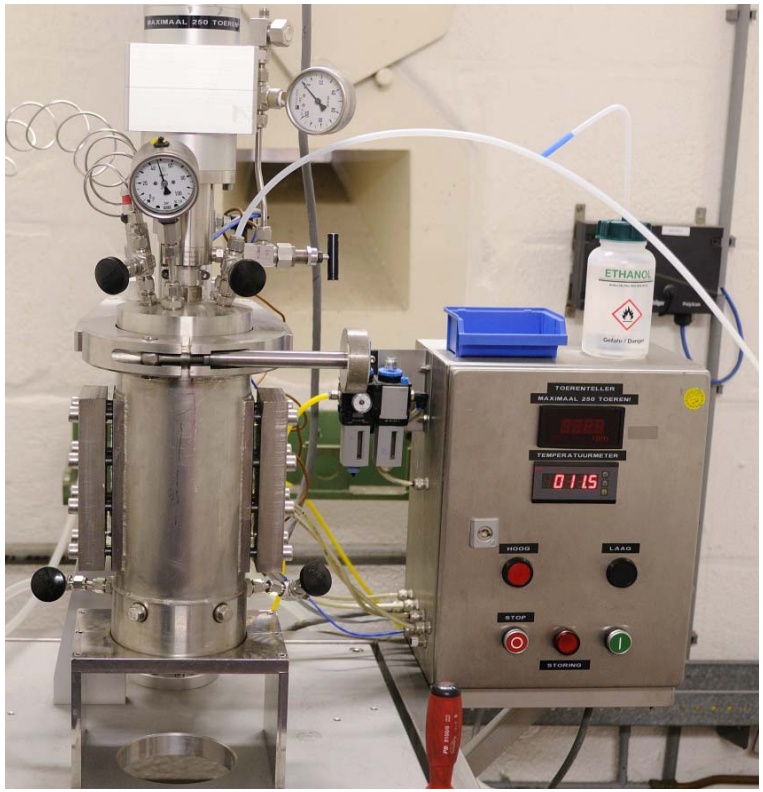
-electro-active polymers for e.g. artificial muscles

-electrical conductive polymers for printable organic electronics

- Development of optical methods for screening textiles materials with antibacterial/antimicrobial treatment, inclusive probiotics
- Microgel for polymeric textile and foils treatment: pH and thermo-responsiveness

Basic facilities, equipment, devices:

- Drop and bubble shape tensiometer PAT, including double capillary method (Sinterface, Germany)
- Tensiometer (DataPhysics, Germany)
- UV-Vis spectrophotometer (Varian) with temperature controller for liquids and solid surfaces for reflectance spectroscopy
- Contact angle measuring device OCA 40 Micro (DataPhysics, Germany); high speed camera up to 1000 images/s and pico-liter droplets in volume (micrometer sized) also suitable for measuring on a single fibre
- Inkjet printer with 1 nozzle and high-speed video camera
- Apparatus with a high pressure cell to studies with $CO_2$ in liquid and supercritical states



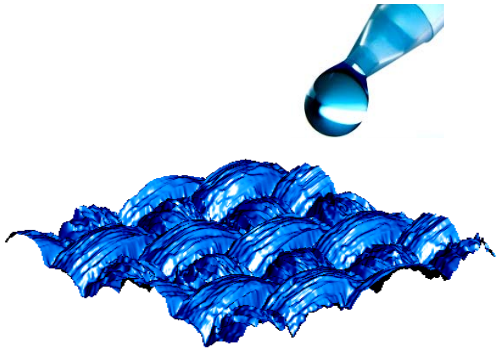
#1 project:

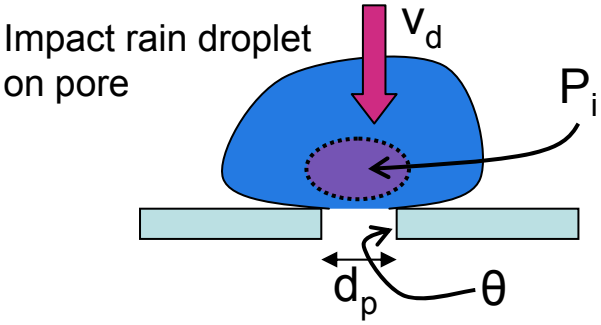

Title: **Wash&Load**
Duration: 3 years, running
Funding organization: **EC**
People involved and their function: 15 partners, incl. PhD
Facilities/equipment: equipment by all of the partners
Most interesting results: developing of re-loadable liquid systems for textile materials during industrial laundering with 3 functionalities soil repellency; flame retardancy, antibacterial properties

#2 project:

Digitex

Title: **DIGITEX**
Duration: 4 years, finished
Funding organization: **EC**
People involved and their function: PhD, postdocs
Facilities/equipment: industrial inkjet printer (Xennia, Tencate)
Most interesting results: Developing slow- and controlled-release systems by digital finishing technology based on host-guest systems on cotton and cyclodextrins



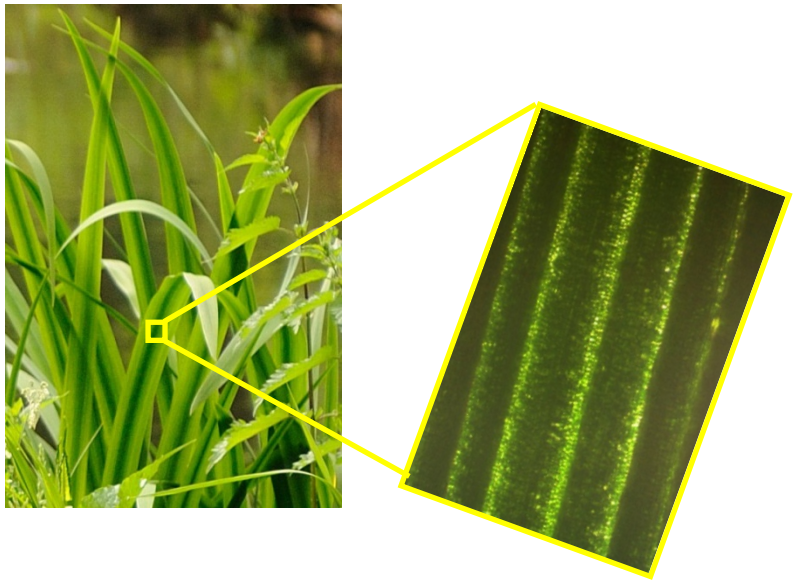


#3 project:

Title: **Dry-cleaning of textiles using liquid $CO_2$**
Duration: 4 years, running
Funding organization: **STW** (national agency)
People involved and their function: 3 Universities, incl. PhD
Facilities/equipment: high pressure cell for $CO_2$ in liquid and supercritical state
Most interesting results: new surfactant formulations for dry-cleaning using liquid $CO_2$

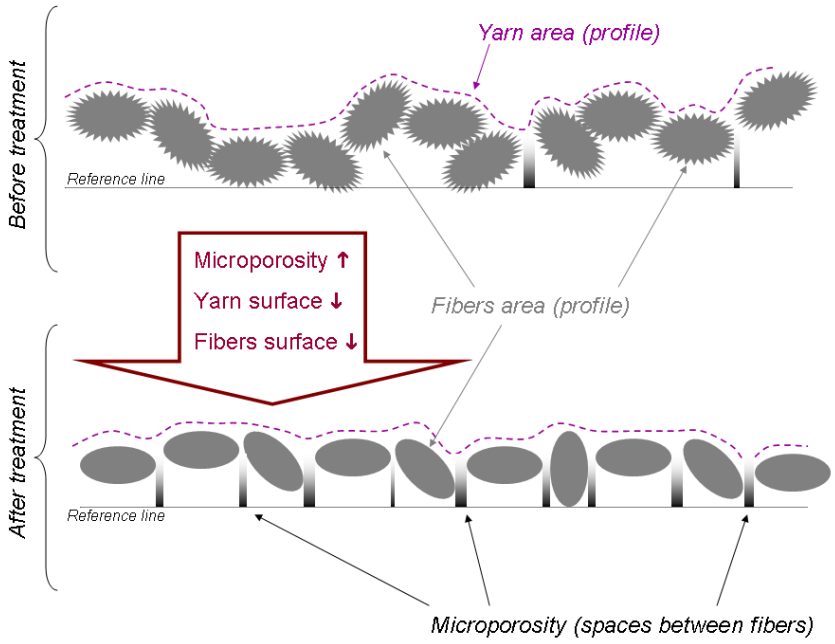

#4 project:

Title: **Implementing moisture management properties to artificial grass**
Duration: since 2011, running
Funding organization: **TENCATE** (industry)
People involved and their function:
Facilities/equipment: available in the laboratory
Most interesting results: a feasibility study to hydrophilize artificial grass by microgel technique



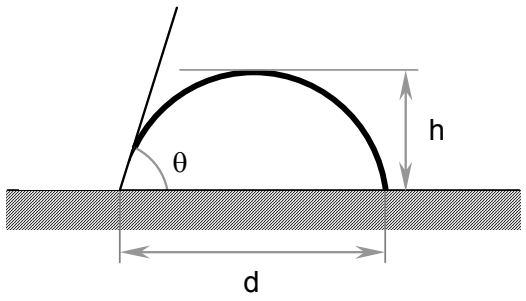
#5 project:

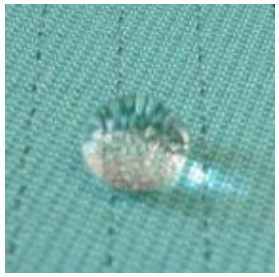
Title: **Improving detergency by adding Soil Release Polymers in laundry detergent composition**
Duration: 4 years, finished
Funding organization: **P&G** (industry)
People involved and their function: PhD technician
Facilities/equipment: confocal microscopy, different wetting devices, SEM, AFM
Most interesting results: improving detergency by synergetic effects of SRP and enzymes; bio-polishing effect on cotton

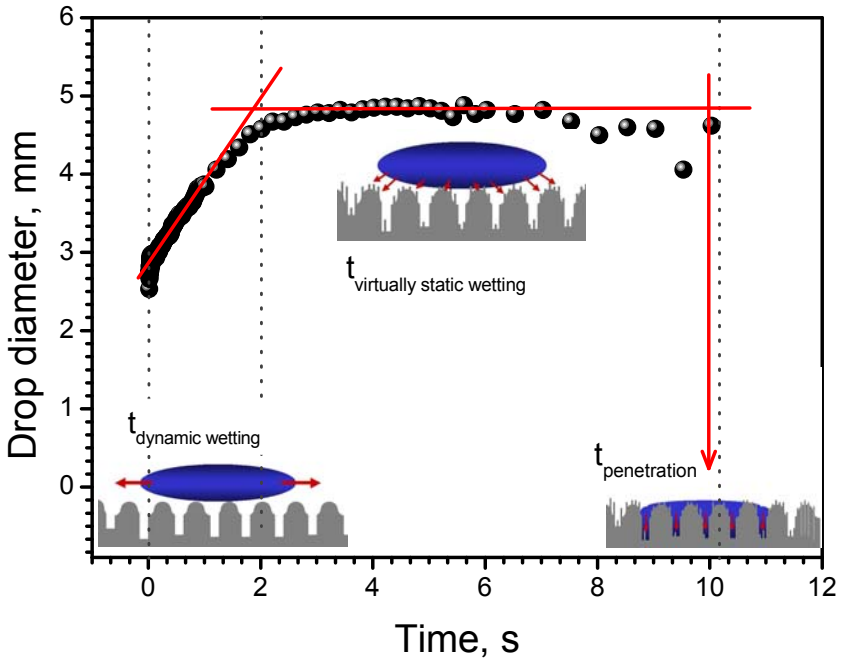


#6 project:

Title: **Basic investigations of wetting kinetics of aqueous surfactant solutions on solid surfaces aimed to developing a screening method**
Duration: 9 years, finished
Funding organization: **SASOL** (industry)
People involved and their function: me, habilitation
Facilities/equipment: confocal microscopy, different wetting devices, SEM, AFM, FTIR, mechanical testing
Most interesting results: new insights into wetting dynamics





#1 Topic

Title: **NANO-INK**
Development of inks containing nanoparticles and dying pigments for inkjet printing to functionalize textile materials

Promotion images & text: company interested in **STORCK PRINTS, TANATEX, XENNIA-TENCATE (NL), SASOL (DE)**

Duration: 4 years

Expertise required: fluid dynamics, stabilization agents, modification of nanoparticles to be irreversibly attached to textile surfaces, surface rheology

Facilities/equipment required:

#2 Topic

Title: **ORG-SMART**
Developing organic electronics technologies for future textile applications

Promotion images & text: interfaces, efficiency, stability, processability problems

Company interested in: **STROCK PRINTS, TENCATE, TANATEX (NL)**

Duration:

Expertise required: synthesis of organic electronics,

Facilities/equipment required:

#3 Topic

Title: **ART-MUSCLES**
Developing artificial muscles to be embedded into textile materials

Promotion images & text: different NL companies interested in

Duration:

Expertise required: synthesis and characterization of electro-active polymers

Facilities/equipment required:

Joint activities of COST Actions **MP1106** and **MP1105**

Training School?


Sustainable flame retardancy for textiles and related materials based on nanoparticles substituting conventional chemicals

Thank you for your attention