

Interplay of Substrate Adaptivity and Wetting Dynamics from Soft Matter to Biology (SYSM)

jointly organised by
the Chemical and Polymer Physics Division (CPP),
the Biological Physics Division (BP), and
the Dynamics and Statistical Physics Division (DY)

Uwe Thiele
Institut für Theoretische Physik
Westfälische Wilhelms-Universität Münster
u.thiele@uni-muenster.de

Karin John
Laboratoire Interdisciplinaire de Physique
Université Grenoble Alpes, CNRS
karin.john@univ-grenoble-alpes.fr

Stefan Karpitschka
AG Grenzflächen komplexer Flüssigkeiten
Max-Planck-Institut für Dynamik &
Selbstorganisation
Göttingen
stefan.karpitschka@ds.mpg.de

Ralf Seemann
AG Geometrie fluider Grenzflächen,
Experimentalphysik
Universität des Saarlandes
Saarbrücken
ralf.seemann@ds.mpg.de

The basic understanding and practical application of the coupled dynamics of a (de)wetting liquid and adaptive soft substrates is attracting increasing interest in fields spanning chemical and biological physics, material science, and hydrodynamics. Examples of substrates include flexible elastomers or hydrogels that form dissipation-rich wetting ridges, polymer brushes that adapt their wettability and mechanical properties by absorbing liquid, or membraneless organelles in a biological cell whose creation and manipulation involves their adhesion to flexible membranes. Wetting interactions may also be manipulated by spatio-temporally structured external fields allowing, for example, wettability-switching triggered by electric fields or light irradiation. In all these systems, capillary and wetting energies interact with elastic properties, possible decomposition and mixing processes as well as absorption, adsorption and desorption processes resulting in feedback mechanism that influence the static and dynamic behaviour of the liquid-substrate system.

In general, one can say that intricate multiscale dynamics results from the coupling of different non-equilibrium processes, that is various mechanisms of energy dissipation may dominate on different time- and length scales, ultimately determining the dynamic behaviour. Furthermore, the interplay of several degrees of freedom offers new possibilities for a targeted control of dynamic wetting processes, but also poses new challenges for experimental investigation and theoretical description: Recent developments in length-scale-bridging experimental techniques allow for in situ (and in vivo) visualisation enabling quantitative analysis while methods from statistical physics to computational fluid and solid dynamics give unprecedented multiscale insight.

Overview of Invited Talks and Sessions

(Lecture hall H1)

Invited Talks

SYSM 1.1	Wed	15:00–15:30	H1	Statics and Dynamics of Soft Wetting — ●BRUNO ANDREOTTI
SYSM 1.2	Wed	15:30–16:00	H1	Droplets on elastic substrates and membranes - Numerical simulation of soft wetting — ●SEBASTIAN ALAND
SYSM 1.3	Wed	16:00–16:30	H1	Wetting of Polymer Brushes in Air — LARS VELDSCHOLTE, GUIDO RITSEMA VAN ECK, LIZ MENSINK, JACCO SNOEIJER, ●SISSI DE BEER
SYSM 1.4	Wed	16:45–17:15	H1	Elastocapillary phenomena in cells — ●ROLAND L. KNORR
SYSM 1.5	Wed	17:15–17:45	H1	Active contact line depinning by micro-organisms spreading on hydrogels — MARC HENNES, JULIEN TAILLEUR, GAËLLE CHARRON, ●ADRIAN DAERR

Sessions

SYSM 1.1–1.5	Wed	15:00–17:45	H1	Interplay of Substrate Adaptivity and Wetting Dynamics from Soft Matter to Biology
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