

Spectral Measurements on Undiluted Samples

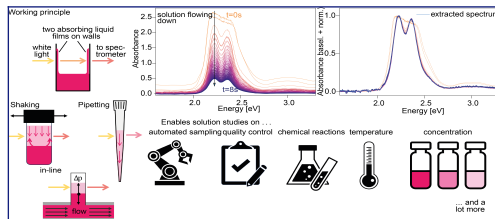
Strongly absorbing liquids are a common challenge in spectral analysis. Conventional methods require dilution or expensive short path cuvettes, which change sample properties and slow down workflows. This solution uses a simple draining liquid film on an optical wall to measure undiluted samples and is directly compatible with inline and at line process-, or tabletop and automated setups.



Measure Any Liquid Sample Without Dilution

A light beam continuously passes through the draining film and records spectra at multiple effective path lengths in one measurement cycle. The system automatically selects the range where absorption is neither too weak nor saturated. Film drainage kinetics simultaneously enable automated inline or at line process monitoring, while also revealing viscosity properties.

- 01** No dilution required: Measure strongly absorbing liquids at full concentration, preserving true sample properties and saving preparation time.
- 02** Viscosity as a bonus: Film drainage speed automatically reveals viscosity with no extra effort.
- 03** Inline ready: A simple pump-based, or pressure valve setup integrates into existing lines.



Measurements on cuvettes, glass jars, pipette tips, or in-line are possible.
J. Phys. Chem. A 2024, 128, 44, 9682–9687.

IP RIGHTS

filed in EP / US

2024

CHALLENGE

Spectral analysis depends heavily on optical density (OD). Depending on the quality of the spectrometer, around an OD of 2, spectral shapes become distorted and results unreliable. Real world samples such as paints, lacquers or foodstuffs often lie far outside this range. Measuring them under process conditions, e.g. during a reaction or cooling, is even harder, because any workaround that alters the sample also alters the very behavior being observed.

INNOVATION

The invention uses a draining liquid film on an optical wall as a dynamically variable path length. A light beam passes continuously through the film, capturing spectra at many effective thicknesses in a single run; software automatically selects the optimal optical density region. The setup is simple, supports UV-VIS-NIR-IR depending on the spectrometer, and can be temperature-controlled. Film thickness can be determined interferometrically or via a tracer, enabling absolute absorption values (e.g. molar extinction coefficients). Reactive components can be added upstream so that chemical reactions in the film are monitored in real time.

01 Basic principles observed · **02** Technology concept formulated · **03** Experimental proof of concept · **04** Technology validated in lab · **05** Technology validated in relevant environment · **06** Technology demonstrated in relevant environment · **07** System prototype demonstrated in operational environment · **08** System complete and qualified

TRL 08

TRL 07

TRL 06

TRL 05

TRL 04

TRL 03

TRL 02

TRL 01

Technology Readiness Level (TRL)



BayPAT

Innovation from Research & Science –
BayPAT markets inventions on behalf
of the Bavarian universities and
universities of applied sciences.

An invention of University of
Bayreuth



UNIVERSITÄT
BAYREUTH

As one of the largest technology transfer offices in Germany, BayPAT evaluates and commercializes innovations from 28 research institutions. With our extensive experience and expertise in patenting and licensing technologies and our comprehensive range of services, we are your partner of choice. For more information visit www.baypat.de

Bayerische Patentallianz GmbH
Dr. Malte Mildner
mmildner@baypat.de
+49 (0)89 5480177-33
Prinzregentenstr. 52
80538 München

