LUM

The NEXT STEP™ in Dispersion Analysis
& Materials Testing

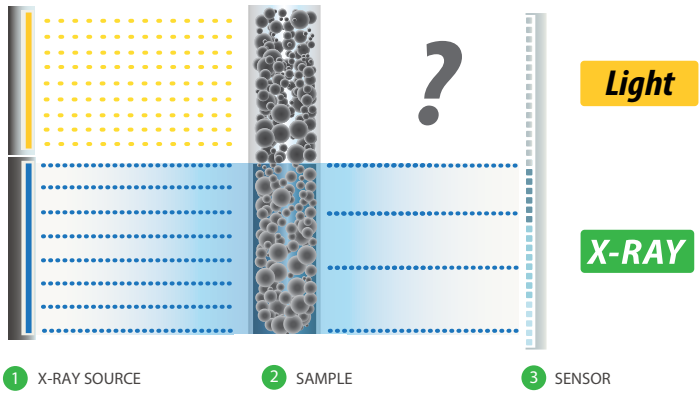
LUMiReader®

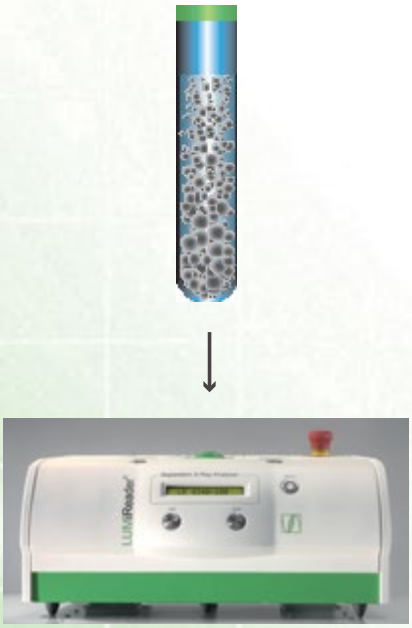
X-RAY

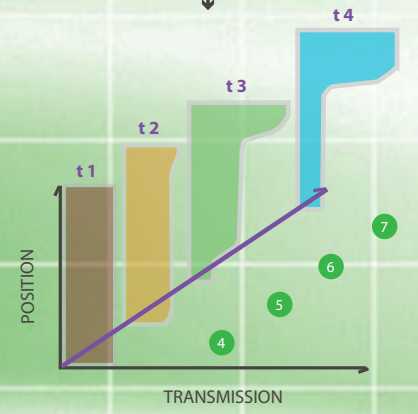
- illuminating even the most concentrated emulsions & suspensions

Phase separation | Stability | Sediment consolidation

LUMiReader® X-Ray using







1 X-RAY SOURCE
2 SAMPLE
3 SENSOR
4 5 6 7 KINETICS OF TRANSMISSION

The LUMiReader® X-Ray is the first dispersion analyser designed for one purpose only: to study dispersability, stability, separation, and consolidation phenomena for completely transparent to completely opaque emulsions or suspensions. For the first time ever, illuminate your sample instantaneously from top to bottom. Solve your most challenging dispersion problems with complete insight. Go places light cannot.

Our patented solution combines x-ray vision with the proven STEP-Technology®, permitting highest spatial resolution, short sampling intervals and powerful detection technique. The LUMiReader® X-Ray creates monochrome and parallel x-rays [1] with the help of a special crystal, which transmits the entire sample cell [2] of 20 mm height. More than 1600 detectors record the transmitted beam, giving an unprecedented resolution [3]. Instantaneous transmission profiles across your whole sample are converted into stability and separation rates. Particle concentration, sediment packing density can also be calculated based on the extinction profiles.

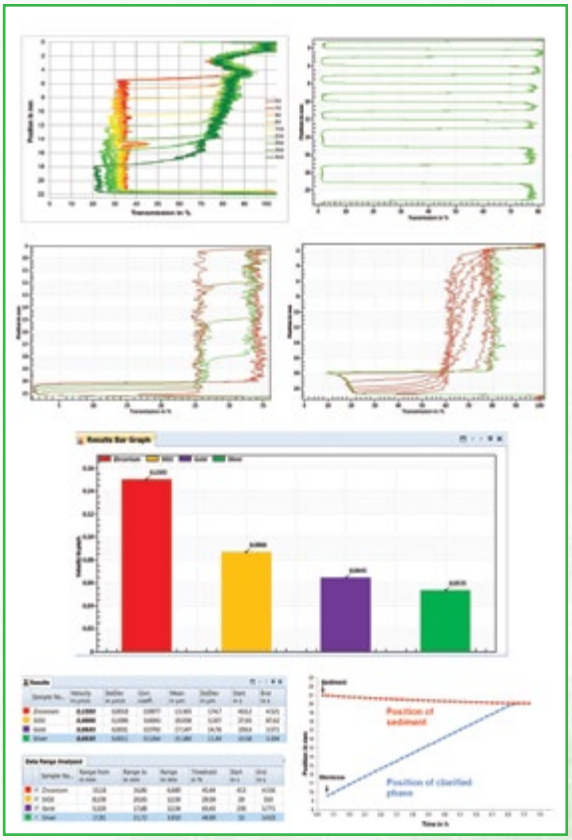
The obtained Space- and Time-resolved Extinction Profiles allow you to measure and understand particle stability, phase separation, and sediment consolidation in systems that where up to now, unknown frontiers of science and technology [4-7].

The LUMiReader® X-Ray allows you to optimize your formulation, measure its stability, and perform accurate shelf life tests, regardless of the shape or concentration of your dispersed particles and droplets. In-situ, real-time, non-invasive and non-destructive.

Typical applications are cosmetics, pharmaceutics, paint & pigments, construction materials and fillers, as well as mining, ceramics and petrol industry dealing with complex emulsions, slurries and sludges.

SEPView®

your window to dispersion analysis



- Windows 7/8 based with Ribbon User Interface
- Plug & play, pack & go
- Individual user customization
- Full SOP concept (Creation, capture, data analysis)
- 8 different tools to understand (quantify)
  even the most complicated dispersion:

Time lapse measurement replay
Dispersion fingerprint
Instability index
Clarification
Phase separation
Sedimentation and creaming velocities
First derivative of integral transmission
Linear X-ray attenuation coefficent

- Analysis templates
- Zoom in and out of any area of interest
- Comparison of old and new measurements
- Comprehensive database security and full audit log
- Complies with 21 CFR Part 11

Safety features

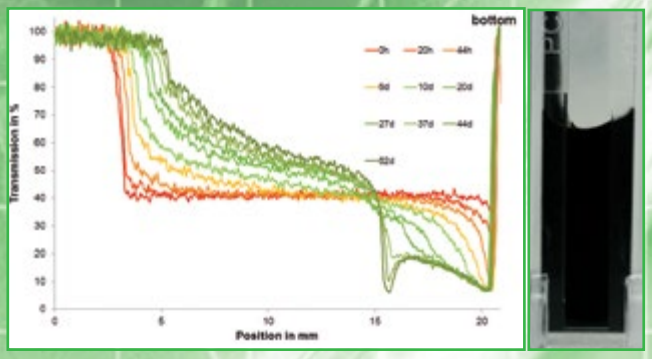
What we have done for your safety

A full protection security circle certified by PTB – the national metrology institute providing scientific and technical services and Federal Office for Radiation Protection (BfS) protects the user. So anyone can employ the instrument free of risk and without worries about the x-ray radiation. No specific training course about x-ray instrumentation, nor any special operation licenses are required by the user.

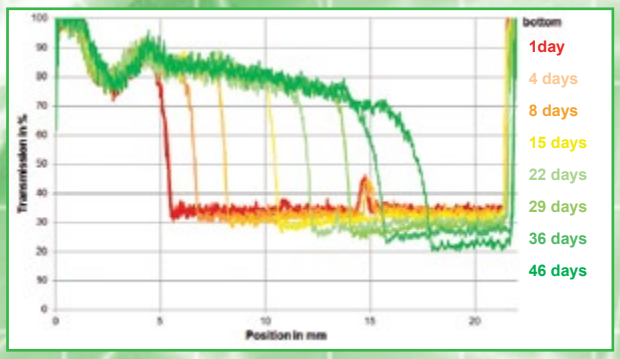
A thick lead layer shields the environment from the x-ray exposure inside the apparatus. Because of this and various other safety designs, there is no detectable energy dose outside the instrument. State of the art interlocks sentinelling the sample lid position and the x-ray tube shutter action. Opening the lid during a measurement causes an immediate shut down of the shutter and the x-ray source, triggered by the sentinel circuit independent from software and user.

Applications & Samples

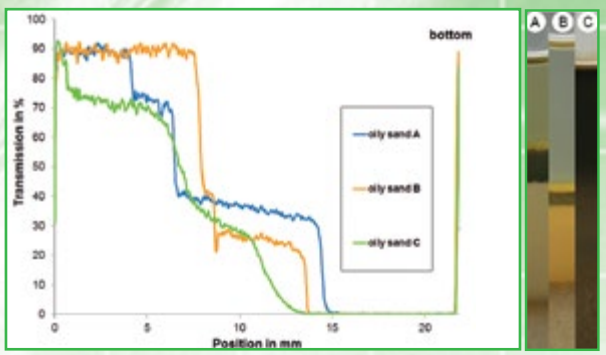
Phase separation of MoS_2-Graphit suspension



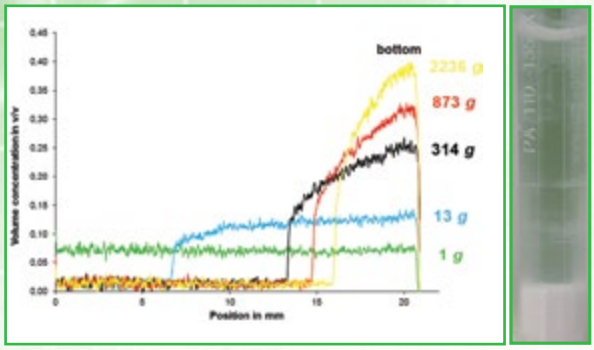
Phase and sediment formation of polymer dispersion



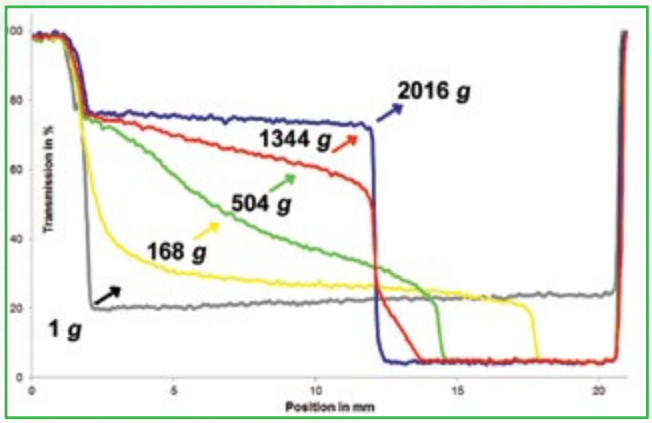
Visual appearance and x-ray intensity profiles of oil sands after separation

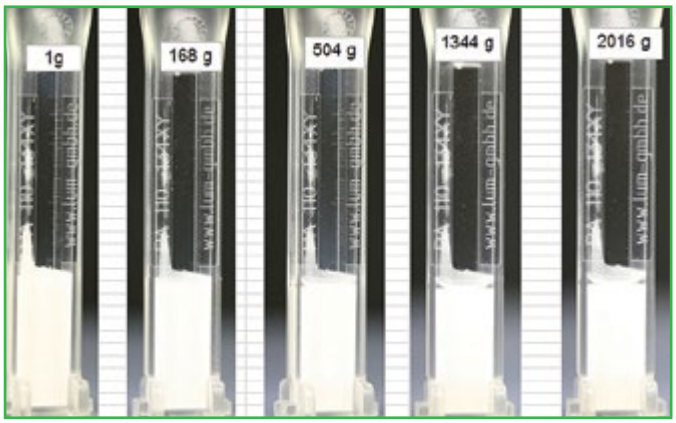


Packing density gradients of lime after centrifugal consolidation



X-ray phase detection of ongoing clarification and sediment growth (left) within even opaque systems (right)





Benefits

extremely high concentrations

- In-situ analysis of transparent as well as opaque dispersions
- No dilution of emulsions or suspensions
- Signal does not depend on particle shape
- See/understand complex dispersion behaviour
- Study the various instability mechanisms
- High resolution of phase separation of multicomponent systems
- Detect concentration gradients within phases and sediment
- Determine mean and space resolved packing sediment densities
- Endless monitoring of sample behaviour
  for long-time storage information
- Use any continuous phase of dispersing agent
- Real time, non-invasive and non destructive
- High-end analyser for QC, process monitoring and R & D



Application Areas

Abrasives
Batteries
Carbon black
Catalysts
Coated particles
Cosmetics
Ceramics
Construction materials
Lubricants
Magnetic particles
Microemulsions
Metals
Mineral powders
Nanosuspensions
Oil sands
Paints
Pigments
Rigid foams
Silicone emulsions
Solid electrolytes



Specifications

Measurement principle	Monoenergetic X-ray attenuation
Phase separation	High concentrated dispersions (transparent or opaque)
In situ sediment analysis	Packing density & structure
Stability analysis	From seconds to days or weeks
Consolidation measurement	Also in combination with LUMiFuge & LUMiSizer
Conformity	ISO/TR 13097; ISO/TR 18811; ISO 18747-1, CFR 21 Part 11
Samples	Suspensions, Emulsions, Suspo-Emulsions, Sludges, Slurries, Foams & Powders
Channels	1 sample
Volume	0.3 ml to 1.6 ml
Concentration	Up to 100 Vol%
Particle	any shape, from nano to microscale, no density restriction
Source	Monoenergetic X-ray, 17.48 keV, max 20 W at 40 kV, air cooled
Monochromator	Graphite
Disturbance free	No moving parts
Dimensions (WxHxD), Weight	47 x 24 x 44 cm, 25 kg
Power supply	24 V, 220 W, Adapter (100 V to 240 V) included
Safety	Fully radiation protected system; Radiation < 1 µSv/h (BfS 03/13 V RöV)
Radiation control requirements	None; instrument can be used anywhere

LUM GmbH, Berlin, Germany
Phone: +49 30 6780 60 30
E-Mail: info@lum-gmbh.de
Web: www.LUM-GmbH.com
www.lumireader-xr.com
www.dispersion-letters.com

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