德国 LUM STEP®–稳定性/分散性/粒度分析

商品技术交流会

利用粒子移动受重力或离心力所驱动以及光学近红外检测的理论基础，德国 LUM 仪器公司开发了专利技术的全功能稳定分析仪系列产品，可以对样品进行分散性、产品存放期、分层稳定性以及粒径大小和粒径分布（百分比率分布）等性能分析，广泛适用于产品的研究、开发、配方改进、流程优化、质量保证等。

LUM 商品已通过 ISO TR 13097 规范：

LUMiSizer 符合 ISO-13318 认定可以准确分析试样的粒径（Particle Size）和分布

LUMiReader 符合 ASTM-D7827-12 的油品测试规范

应用领域：

纳米颗粒表面改质或活性剂、燃料、电池、墨水、墨粉、涂料、染料、颜料和分散剂、食品和饮料、药物和化妆品、感光乳剂、精细化工产品、陶瓷和水泥、化学和聚合悬浮液、高分子乳液、胶粘剂和凝胶体、脂质体、细胞和生化胶体、润滑剂、原油和沥青、纸浆和造纸工业、污泥和泥浆以及废水处理、化学机械抛光剂和研磨磨料、石油与石化工业、农业化肥、化学用品。

为感谢贵单位对德国 LUM 设备的支持!!

源顺国际公司将与贵单位共同切磋探讨 LUM 的量测操作教学与技术指导交流。

＊联系窗口：Jesse Huang 黄子恩

源顺国际有限公司 市场行销经理 & 技术专员

联络手机：+86-18621550294

◎ 2014- 3 - 28 ◎

日期	时 间	主 讲 人
2014 3/28 (五)	14:30 ~ 14:45	Jesse Huang 开场白
	14:45 ~ 16:45	Dr. Lerche 技术交流演说
	16:45 ~ 17:00	Q & A

Prof. Dr. Dietmar Lerche
Managing Director
LUM GmbH
Justus-von-Liebig-Str. 3, 12489 Berlin
Germany

Abstract

During formulation of new dispersion products, properties have to be adjusted to obtain the desired stability, textural and rheological properties. Often stable colloidal dispersions (good dispersability) are required, however, in other cases weak particle-particle interaction is purposely induced to adjust structural properties or strong flocculation is helpful to separate dispersed particles. These phenomena are strongly governed by surface property of particles. It is evident that the characterization of the degree or absence of flocculation (net attractive particle interaction) is a universal task for every day formulation and optimization work.

On the one hand Hansen solubility parameter may be used to predict dispersability of to be dispersed particles in a given countinous pahse (e.g. a polymer matri). On the other hand it is common to use zeta potential to predict stability or particle-particle interaction despite, generally speaking, it is limited to classical electrostatically stabilized systems. Especially for so-called soft nano- or micr-oparticles, i.e. hard particles covered with an ion-penetrable layer of polyelectrolytes, electrophoretic mobility does not allow calculating the value of zeta-potential by the Smoluchowski approach.

Multisample sedimentation analysis under gravity (LUMiReader) or analytical centrifugation (LUMiSizer) with photometric detection of spatially resolved concentration changes is powerful to characterize the dispersed state/degree of particle-particle interaction. The visualization of the in situ separation behaviour classifies very clearly swarm sedimentation (stable dispersion, good dispersability) and zone sedimentation (bad dispersability due to flocculation or agglomeration). Even more, complex systems with subfractions of particles exhibiting a different behaviour can be identified.

In the first part of this paper we are going to describe the basics of STEP-technology and some general results. In the second part, we present detailed results regarding the dispersability of Multicarbonnanotubes from different manufactures in dependence on surfactant and homogenization procedure. Furthermore, several examples for soft particles (Silica nano-particles with adsorbed Cytochrom in dependence on pH and salt concentration as well as magnetic nano-particles with polyelectrolyte decoration of different density) are presented demonstrating that colloidal stability and the degree of particle flocculation/agglomeration of dispersed soft nano- or micro-particles is comprehensively obtained/predicted by visualization of separation behavior. It may be quantified by the consolidation behavior (sediment thickness) at increasing centrifugal acceleration/excess pressure. In contrast, particle-particle interaction is not correctly classified by values of zeta potential calculated based on common Smoluchowski approach,

which is applicable only for hard particles. The new approach to characterize the surface properties and the interaction between particles can be applied for high volume concentrations, any pH and ionic composition as well as for organic continues phases.

Keywords: particle interaction, colloidal stability, dispersability, flocculation, zeta-potential, separation behaviour, soft particles, Hansen solubility parameter

Biography

1966 – 1972	Studies in Natural Sciences (Biophysics) Lomonossow University (Moscow, USSR): B.Sci. Humboldt University (Berlin, Germany), M.Sci.
25.05.1974	Ph. D., Humboldt University, Berlin Thesis: "Mass Transport Across Artificial Membranes with Regard to Diffusion Layers"
18.11.1980	Dr. Sci.,Faculty of Math. and Nat. Science, Humboldt University, Berlin Thesis: "Interactions of Human Erythrocytes as a Model for the Primary Steps of Animal Cell-Cell Contact"
1972 – 1980	Junior/Senior Teaching and Research Assistant, The Department of Biophysics of the School of Biology, Humboldt University (Berlin, Germany)
1980 – 1989	Assistant/Associate Professor, The Institute of Medical Physics and Biophysics, Medical School Charité of the Humboldt University; (Berlin, Germany)
1989 – 1994	Director, The Institute of Medical Physics and Biophysics, Medical School Charité, Humboldt University
1990 – 1994	Full Univ.-Professor, The Institute of Medical Physics and Biophysic, Medical School Charité of Humboldt University,
1991 – 2009	Chairman/Member of the Common Committee "Medical Physics", Humboldt-University and Free University (Berlin, Germany)

Scientific Research Fields:

Particle characterization, Sedimentation and Consolidation of Dispersions, Colloid Chemistry, Cell Mechanics, Blood Rheology, Fluid Dynamics
(more than 200 peer reviewed papers, numerous granted patents)

Awards:

1972	"Fichte-Prize (1. Level)" Humboldt-University of Berlin,
1985	"Prize" of the Soc. of Experimental Medicine, Berlin,
1989	"Virchow-Prize" of the Ministry of Health of the GDR,
1991	Honorary Membership of the Biophysical Society of Shanghai (China)
2008	Gold Medal of the Int. Society of Filtration

Business Activities:

1994 -	Founder and Managing Director of L.U.M. Gesellschaft für Labor-, Umweltdiagnostik & Medizintechnik mbH (L.U.M. GmbH, Berlin, Germany, www.lum-gmbh.com) Innovativ analytical instruments for comprehensive dispersion analysis
2003 -	Formation and Managing Director of the biotec company Dr. Lerche KG as a spin-off from the L.U.M. GmbH (www.lerche-biotec.com)
2005 -	Founder and Director of board of the daughter company LUM Corp., Boulder, CO. (www.lumamericas.com)

Memberships (current):

ISO-TC 24/SC4*:	Convener of working group 2 “Particle sizing by sedimentation methods” Convener of working group 16 “Characterization of particle dispersion in liquids” *Partice Characterization and Particle Measurement
ASTM	

Sub-Com. D02:	Responcible for WK 33116 : “Standard Test Method for Measuring n-Heptane Induced Phase Separation of Asphaltene-Containing Heavy Fuel Oils as Separability Number by an Optical Device
Member of DIN*	
Bau 005-11- 42AA:	“Partikelmesstechnik (particle measuring technologies)”
NAMed AAC6:	“Hämatologie (Hematology)”
	*German Institute for Standardization
Board of Editors:	Int. Journal “Biorheology” (IOS Press)
VDI-GVC*:	Subject Devision “Rheology”
	Subject Devision “Mechanical Liquid Separation”
	Subject Devision “Particle Measurement”
	*by appointment of “The Association of German Engineers - Society for Chemical and Process Engineering.
Amer. Filtration Society:	Member of Advisery Scientific Committee , elected for 2011 - 2013
Scientific Chair:	Int. Workshop on Dispersion Characterization (Berlin, 2012, 2013)

LUM

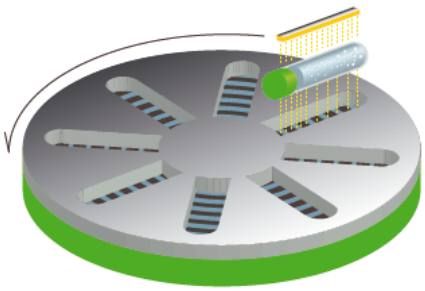
The NEXT STEP® in Dispersion Analysis

Dispersion Analyser LUMiSizer®

LUM中国区总代理
源顺国际有限公司

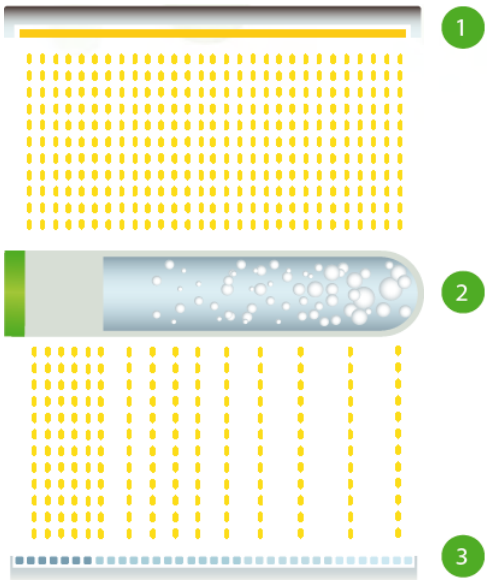
STEP-Technology®

Space- and Time-resolved Extinction Profiles



时间与空间的光遮蔽图谱

犹如一座小型的分散性实验室，提供实验中所有区域内不同的信息，创造前所未有的数据及图谱。

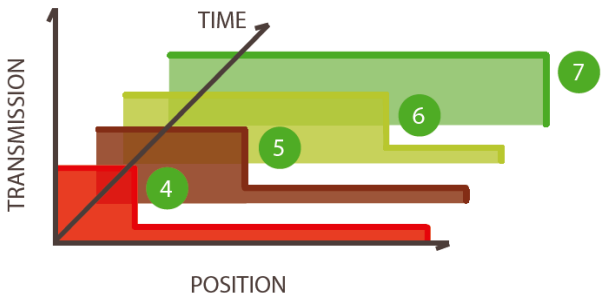


讯息纪录

毫不遗漏的记录下样品每个部份的变化，并具备回放功能，让您回到过去并浏览每个变化的当下。

数据整合

包含时间、位置、实际受力值、转速、温度、不同时间全区域的光穿透值等细部信息，巨细靡遗、一目了然。



1 LIGHT SOURCE

2 SAMPLE [0.1-2.0ml]

3 SENSOR [2048 detectors]

4 5 6 7 KINETICS OF TRANSMISSION / EXTINCTION PROFILES

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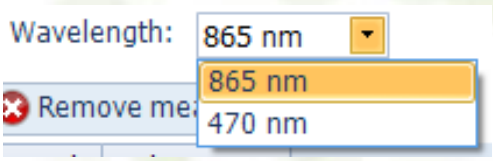
SEPView®

your window to dispersion analysis

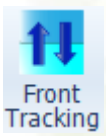
藉由完整的纪录信息后
可依需求做不同方式的
分析，包含：



光源选择

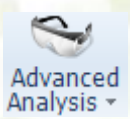
澄清指数分析

光穿透比与时间关系

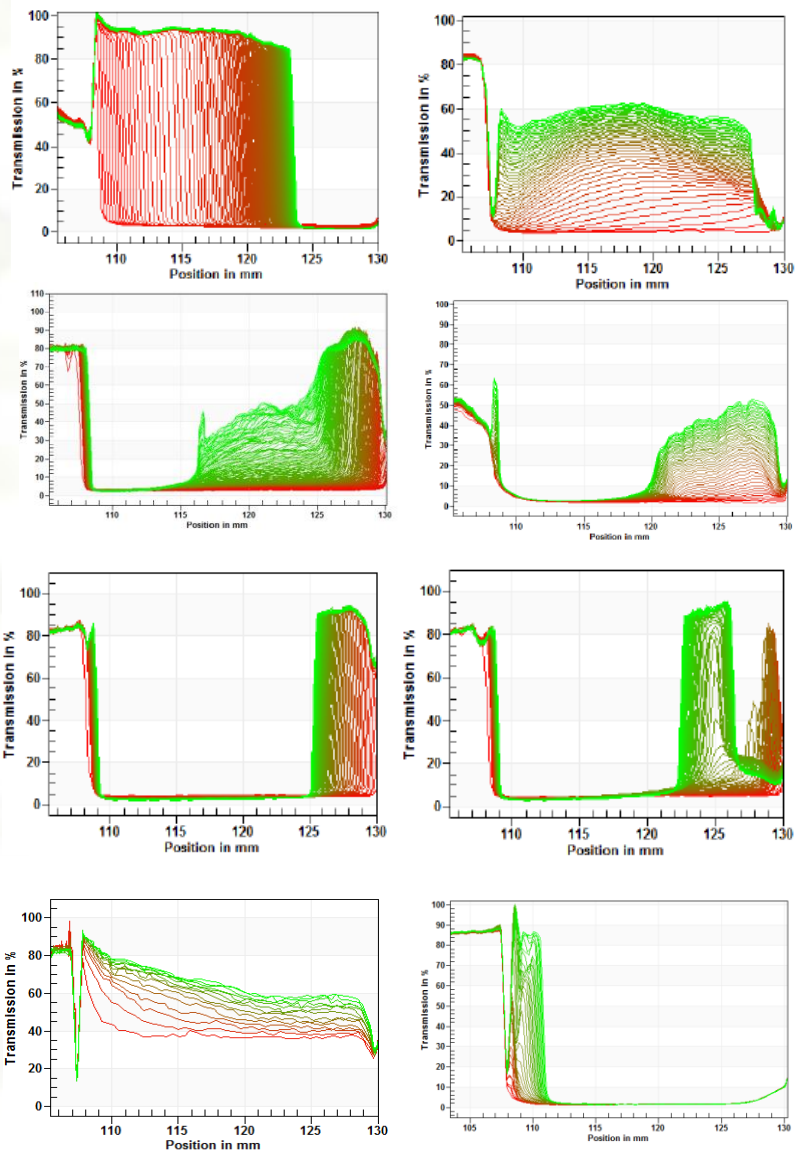


移动速度与时间关系

粒径分析



进阶分析



LUMiSizer® 符合 ISO

ISO TR 13097
ISO 13318
CFR21 Part 11

LUM中国区总代理
源顺国际有限公司

LUMiSizer®规格

仪器规格	
电源	220V / 50-60 Hz
最高转速	4000 rpm
最低转速	200 rpm
样品放置槽	12(个)
仪器放置环境温度范围	10℃~ 26℃
仪器放置环境最高湿度	75%
重量	38 kg
体积	37*27*60 cm

技术规格	
重力模拟(G)	5xG ~ 2300xG
粒径量测范围	10 nm ~ 1000 µm
同时测量	沉积物 悬浮物 分散物
样品体积	0.05 ml ~ 2 ml
样品浓度	0.01Vol% ~ 90Vol%
样品密度	Max 22 g/cm^3
样品黏度	0.8 ~ 10^8 mPas
体积	37*27*60cm
光径长度	1、2、10mm
试管材质	PA 、PC、石英管

系统控制
SEPView(需License认证)

光学系统	
量测原理	全球专利STEP技术
光源	NIR-LED 870 nm Blue-LED 470 nm
检测器	2048 个CCD
CCD间距	14 µm
检测器总长	25 mm
消光范围	0.1~4.0

*蓝光(470nm)仅搭载于LUMiSizer 651

温控系统	
程控范围	4℃~60℃
加热方式	主动式电加热
冷却方式	主动式致冷系统

型号
LUMiSizer 651 双光源 4℃~60℃
LUMiSizer 650 双光源 4℃~40℃
LUMiSizer 611 单光源 4℃~60℃
LUMiSizer 610 单光源 4℃~40℃

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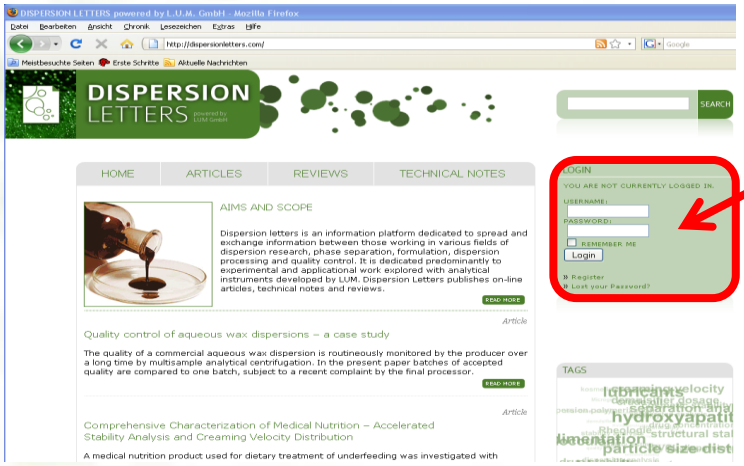
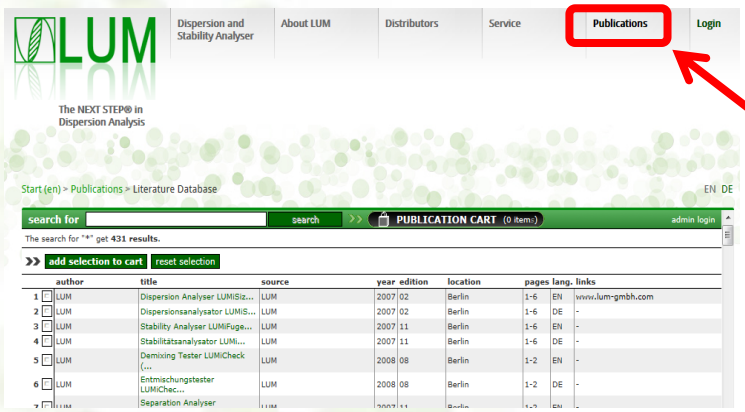
LUM为您提供数据库及交流平台

LUM论壇 http://dispersionletters.com/



免费会员注册

LUM官方Database http://lum-gmbh.com



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网页下方有详细信息(彩业、视频、应用文件等...下载点

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人性化 直觉的操作让您短时间学会分析

真实性 不须稀释，让您看见最真实的分散行为

适性 浓至牙膏类型，稀至奈米溶液都可使用LUM分析

多样性 各式产业、各样分析、各类用途、各种想法，让您一次满足

模块化 一个盒子、一台笔电、一条USB...插电后实验开始

连贯性 进料、研发、制成、品管、运送，全方位使用

.....

想知道更多吗??
欢迎联络我们~~

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