Sirius SDI with Actipix™ Technology

Surface Dissolution Imaging

See what you're missing!

The Sirius SDI (Surface Dissolution Imager) is a technological break-through in dissolution imaging. For the first time this instrument provides the ability to look directly at the solid-liquid interface as the dissolution process is happening. Real-time ultra-violet (UV) movies of the dissolution process can be gained microns from the drug surface using as little as 2mg of sample and less than 20mL of dissolution medium within 30 minutes. The Sirius SDI includes award-winning ActiPix™ UV area imaging technology combined with a laminar flow-through sample holder, integrated syringe pump and software, enabling real-time recording and review of data. The flow cell provides a constant velocity of laminar flow, creating steady-state conditions to obtain reproducible values for each moment of flow. A 2-dimensional (2-D) array of pixels collect a series of images at pre-chosen wavelengths to provide absorbance data over a 2-D area. When combined with specialized software analysis tools, analysts can gain a unique and time-saving insight into a compounds performance, as physical changes and dissolution can be visualized simultaneously.

Used to accelerate pre-formulations development, the Sirius SDI enables intrinsic dissolution rates to be obtained in a fraction of time compared with conventional dissolution systems. From new drug discovery to compound formulation, the Sirius SDI will preserve precious test batches along with saving months in development time.

ActiPix™ technology

At the heart of the ActiPix™, a parallel array detector provides intensity measurements at every point inside the viewing area, which has hundreds of pixels converting photons measuring absorbance over a large area. Individual pixels can be selected for measurement of absorbance values, and accurate measurement of location or distance relative to any origin from the dimensions of each pixel allows for dimensional analysis and distance profiling. The absorbance values for each pixel in the selected viewing area create a 2-D image, and the images collected for the duration of the experiment are used to create a movie. Therefore a high-resolution 2-D movie of UV absorbance is captured, providing a detailed view of the dissolution process at the solid-liquid interface in real-time as it happens (Figures 1 and 2). Visual insight into the dissolution process can be gained for the first time!

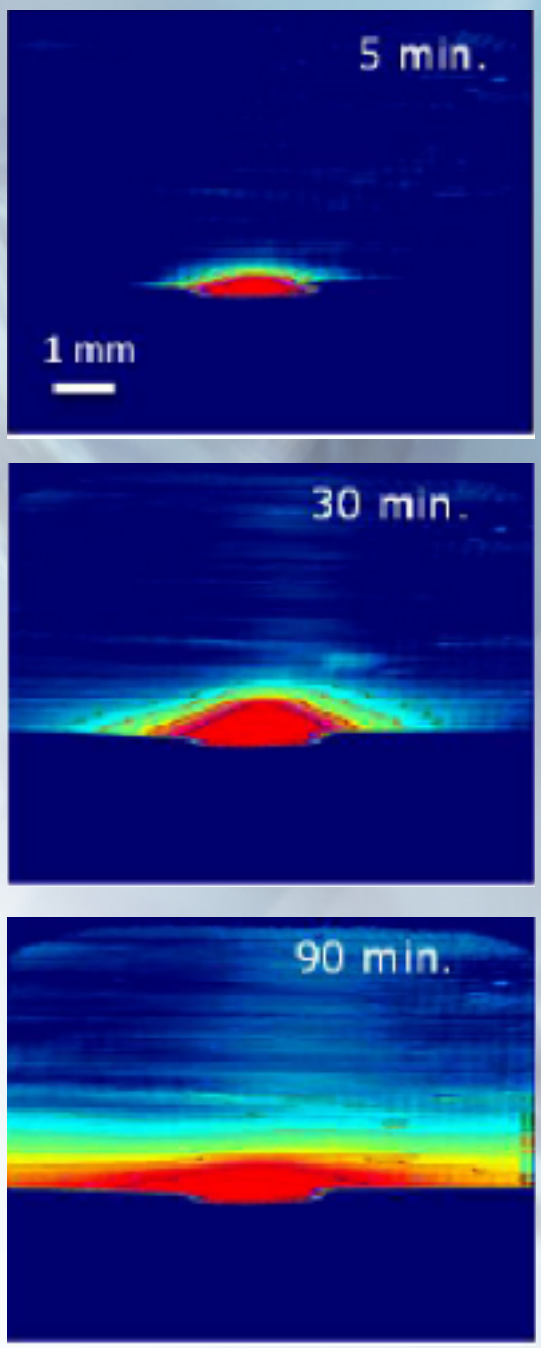

Figure 1a: UV absorbance maps of the dissolution of a sample.
Image is falsely coloured to aid visualization, where red represents high absorbance and dark blue represents low absorbance.

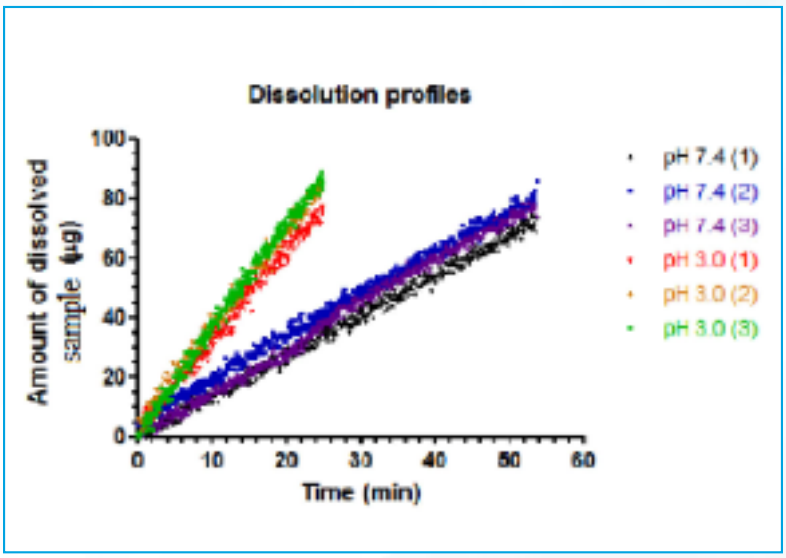

Figure 1b: Ranking of intrinsic dissolution rate from experimental onset. *Dissolution profiles of a sample in dissolution medium at different pH (n=3).*

Features	Benefits
Visualization of dissolution phenomena in real-time	Provides a unique insight into the mechanistic understanding of the dissolution process of functional formulations as they happen, including visualization of physical changes such as surface swelling, sample breakdown, wettability effects and cumulative mass loss
Ranking of intrinsic dissolution and diffusion rate from experimental onset	Measurement of solution concentration from only a few hundred microns from the surface of the solid/solution interface allows for ranking of the dissolution process right from the very onset of the experiment. This provides an understanding of early occurrences of the dissolution process directly at the drug surface otherwise missed using traditional dissolution testing methods
Determination of formation of concentration gradients	Determination of solution concentration at the microscopic level by measuring the local concentration gradients by a spatially resolved concentration measurement technique provides previously undetectable information about concentration gradients close to the solid/solution interface
Ability to control variable flow rate	Allows for ability to apply physiologically relevant flow rates of dissolution medium, therefore providing the ability to take fluid characteristics into account and include hydrodynamic effects
Small cell volume (0.5mL)	Allows faster measurements in less than 30 minutes rather than hours or days
Minimal sample requirements (2-10mg)	Ideal for early development stages with limited compound availabilities
Flexible cell to accommodate variety of samples	Powders, suspensions, creams, gels, liquids, pellets, crystals, stents, implants, trans-dermal patches and other samples can all be applied
Functionality with variety of media types	Variety of dissolution media including bio-relevant media can be applied from experimental onset with less than 20mL requirement per experiment
Zero turbulence media flow cell	Provides steady-state conditions for reproducible values
Ability of the flow cell to detect changes in pH sensitive dye	Detection of in situ surface pH measurements and determination of micro-environmental changes in pH

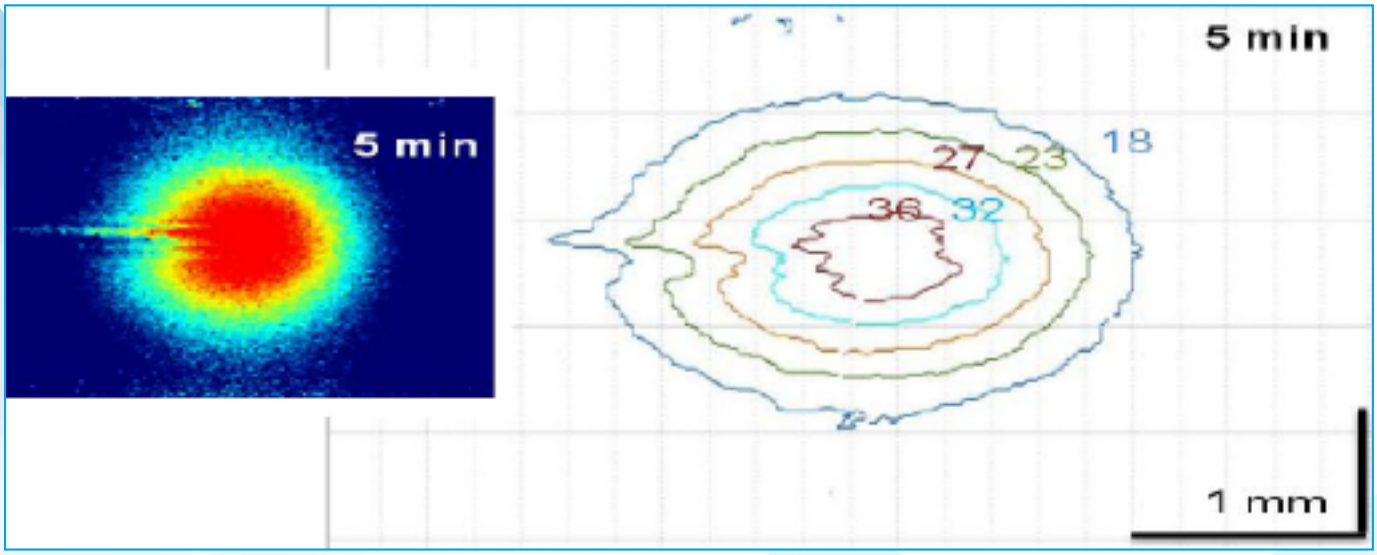

Figure 2: Formation of concentration gradients.
UV absorbance map showing iso-concentration contour lines of a sample after 5 minutes of dissolution. Numbers represent apparent concentrations in micromolar.

Compact

The Sirius SDI makes the best use of your laboratory space. With a small footprint of Xcm(W) x Xcm(D) x Xcm(H) it can be easily accommodated in most laboratories.

Compliant

The Sirius SDI is available with (insert as appropriate) software.

Support

You are not on your own. When you purchase a Sirius SDI you will have access to Sirius' expert applications chemist and engineering support.

Try it!

The power of visualization, without needing numbers. Seeing is believing!

Technical Specification

LAMP	
Wavelength range	UV 190 – 300 nm, as individual single wavelength ± 5 nm
	Vis 350 – 1100 nm, as individual single wavelength ± 5 nm
Response	2.0 / 0.005 AU
CAMERA	
Dimensions (H x W)	7 mm x 9 mm
Frame rate	4 images / sec (standard)
Image area	400 rows (standard)
Pixel size	7 μm^2
CADISS-3 CARTRIDGE	
pH range	1.0 – 10.0
Solvent compatibility	Some materials are organic solvent incompatible.
Flow cell volume	0.50 ml
Connection	Luer
Quartz cell	7 mm x 4mm ID.
SAMPLE HOLDER	
Dimensions	
Powder, solids, patches (ID x H)	2.0 mm x 2.40 mm. 2-10 mg sample
Liquid / Gel (L x W)	5.0 mm x 1.8 mm.15µl volume
Material	
Powder, solids, patches	316 stainless steel and PEEK
Liquids	Polypropylene and PEEK
PRESS	
Material	316 Stainless Steel
Torque wrench	Calibrated 20 – 120 cN.m. PSI equivalent 9000–46000
PUMP	
Flow rate min & max (Working)	0.001 ml/min & 6 ml/min (0.1 to 1.0 ml/min)
Accuracy	± 0.1%
Syringe type	Female Luer
Syringe volume	20 ml as supplied
TEMPERATURE CONTROL	
Range	Ambient to 37ºC
Stability	± 0.5 ºC, at nominal flow rates
Display	0.1 ºC, digital
SOFTWARE	
File extension	ActiPix proprietary
Image export	.wmv
Data export	.xls ActiPix, Pump and Heater are CE Certified
SYSTEM	
Operating temperature range	10 to 30 ºC
Input voltage	115/230 VAC 50/60 Hz (x5)
Dimensions (H x W x D)	(27 cm x 52 cm x 28 cm)

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