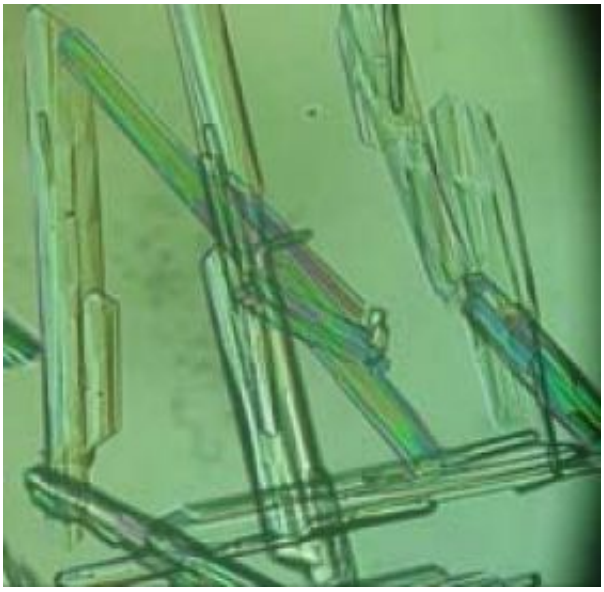
Crystal clear savings for drug giants

June 6 2008



Beta version of L-Glutamic Acid as determined using on-line powder X-ray diffraction. Credit: University of Leeds

Drug companies could save millions thanks to a new technology to monitor crystals as they form. The technique, developed by University of Leeds engineers, is a potentially invaluable tool in drug manufacture, where controlling crystal forms is crucial both to cost and product safety.

Most drug compounds are crystalline and their structure can affect both their physical attributes and their performance. Changes to these structures are often caused by undetected fluctuations in the process.

"If you were to use a pencil to write on glass you wouldn't get very far, but use a diamond and you could write your name. Yet both are pure forms of carbon. It's the same with different solid forms of the same drug; they can have completely different properties," says Dr Robert Hammond of the University's Faculty of Engineering, who leads the research team.

"Drug molecules are becoming increasingly complex and the challenges involved in processing them means that it is not always possible to successfully produce the desired form reliably. That's why there's such enormous potential for our system. We're now able to look at crystals as they are forming in a reactor, something that has never been done before."

The new technology identifies and monitors changes in crystal structures on-line, providing a method of ensuring production of the desired drug compounds. The bespoke system has been developed by engineers at the University of Leeds in collaboration with Bede X-Ray Metrology as part of the EPSRC funded Chemicals Behaving Badly programme.

Called polymorphism, changes in crystal structure during processing can lead to huge delays in bringing drugs to market, costing drug companies many millions of pounds. It can also lead to challenges to intellectual property protection. There have been a number of high profile cases where patents have been challenged by companies making an established formulation using a different polymorph.

"It's an enormous problem for drug companies," explains Dr Hammond. "Their patents are extremely valuable – they are granted for 20 years, but it can take ten years to bring a new drug to market, which only leaves another ten to recoup the cost of its development."

The technology developed at Leeds is based on the 'gold standard'

method for monitoring crystal structures - powder X-ray diffraction, the primary tool for studying polymorphs.

"There's enormous commercial potential for this technology, for example it could be developed to work at manufacturing plant scales and can be applied to speciality chemical industries as well," says Dr Hammond. "We're interested in talking to pharmaceutical and speciality chemical companies that can help us drive this forward."

Source: University of Leeds