

# The acid test: 21st century pH meter

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Modern methods for mass production of biological agents and fine chemicals require precise control of pH. However within these systems it is not always possible to use traditional methods for measuring acidity and alkalinity. Biomed Central's open access journal *BMC Biotechnology* describes a new and user friendly method for measuring pH, which uses luminescent dual life-time referencing (DLR), to provide real-time characteristics of enzyme reactions.

Industrial methods for manufacturing compounds often requires the use of an enzyme (bio-catalyst). In order for the enzyme to be recovered and re-used at the end of the process they are usually attached to a carrier such as [polymer beads](#) and then kept in suspension by continuous mixing of the reaction. Under these conditions, although the pH of the bulk liquid can be controlled it is difficult to accurately measure what is happening at the level of the enzyme. This is especially important for reactions which involve changes in proton concentrations.

A team from Graz University of Technology, Austria, have developed a luminescent method for measuring pH in enzyme reactions based on DLR. It combines a luminescent pH indicator and a reference standard which are excited at the same wavelength. Both indicator and standard also emit at similar wavelengths (different to the excitation [wavelength](#)). The phase shift in the ratio of the two intensities alters with pH because there is difference in the time it takes for the indicator [luminescence](#) to decay.

The team led by Bernd Nidetzky tested the DLR-based pH meter on the

reaction catalyzed by cephalosporin C amidase. This enzyme hydrolyses cephalosporin C, but the reaction results in the formation of a proton which can alter local pH relative to the surrounding liquid. Using the new pH meter the researchers were able to measure that the pH of the reaction initially dropped and then steadily rose as the substrate (cephalosporin C) was used up.

Prof Nidetzky explained, "This new method is self referencing and is easy to use because it only requires a single photodetector. It is not affected by optical interference in the same way as other luminescent pH meters and, because phase shift data are not affected by particle movement, this method is ideal for applications inside a stirred tank."

**More information:** Dual-lifetime referencing (DLR): a powerful method for on-line measurement of internal pH in carrier-bound immobilized biocatalysts Caterina Boniello, Torsten Mayr, Juan M Bolivar and Bernd Nidetzky *BMC Biotechnology* (in press)

Provided by BioMed Central

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