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Optical device for parallel online measurement of dissolved oxygen and pH in shake flask cultures

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Abstract:

We describe a new device with parallel optical measurement of dissolved oxygen (DO) and pH in up to nine shake flasks applicable in any conventional shaking incubator. Measurement ranges are 0–500% of air saturation for oxygen and 5.5–8.5 for pH. It was used to characterize growth profiles of different L-lysine producing strains of *Corynebacterium glutamicum*, of *Saccharomyces cerevisiae* and of Escherichia coli. Cultures in unbaffled flasks were highly reproducible. Oxygen limitation was indicated online which is particularly important when cultivating fast growing cells as *E. coli. C. glutamicum* strains showed distinct characteristic patterns of DO and pH indicating biological events. During the cultivation of *S. cerevisiae* on glucose, fructose and galactose, oxygen uptake rate was determined using the predetermined value of k_La. pH measurement was used to determine the minimum buffer requirement for a culture of C. glutamicum.

Key-words: Shake flask, Optode, Dissolved oxygen, pH, Online measurement