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A shaken disposable bioreactor system for controlled insect cell cultivations at milliliter-scale

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Abstract:

While wave-mixed and stirred bag bioreactors are common devices for rapid, safe insect cell culture-based production at liter-scale, orbitally shaken disposable flasks are mainly used for screening studies at milliliter-scale. In contrast to the two aforementioned bag bioreactor types, which can be operated with standard or disposable sensors, shaker flasks have not been instrumented until recently. The combination of 250mL disposable shake flasks with PreSens's Shake Flask Reader enables both pH and dissolved oxygen to be measured, as well as allowing characterization of oxygen mass transfer. Volumetric oxygen transfer coefficients (k_La -values) for PreSens 250mL disposable shake flasks, which were determined for the first time in insect cell culture medium at varying culture volumes and shaker frequencies, ranged between 4.4 and 37.9/h. Moreover, it was demonstrated that online monitoring of dissolved oxygen in shake flasks is relevant for limitation-free growth of insect cells up to high cell densities in batch mode ($1.6 \cdot 10^7$ cells/mL) and for the efficient expression of an intracellular model protein.

Key-words: Insect cells, k_La , Recombinant proteins, Shaken disposable bioreactors