

Biomass Fermentation - Filamentous Fungi

The productivity of a biological process is primarily defined by the amount of biomass generated during fermentation. Biomass measurements coupled with growth rate are critical for maintaining a steady state during a continuous process. Commonly, optical density (OD @600 nm) is used for biomass measurement which depends on the uniform scattering of light for the prediction of the number of cells in a suspension. However, the uniform light scattering is not possible if cells occur in clumps/chains such as in case of fungi, where the cells morphology is filamentous in its nature.

As such, physical methods have been employed to determine the fungal biomass, which relies on sample harvesting and off line dry cell weight measurements. This has various limitations which can affect biomass measurement/calculation and can take between 45 min to 4 hours depending on the equipment used. The physical method also fails to discriminate between biomass and necromass. Therefore, there is a requirement for the accurate measurement and control of biomass within fermenter, at both laboratory and industrial scale.

For more reliable real-time online measurements, this study was designed to evaluate Aber Capacitance technology for measuring filamentous fungal biomass. Capacitance (pF/cm) measured online was therefore compared with the physically measured cell dry weight. The primary aim of the investigation was to evaluate the accuracy of using an ABER probe to measure biomass online between capacitance and biomass.

Data obtained using Aber Flush Probe

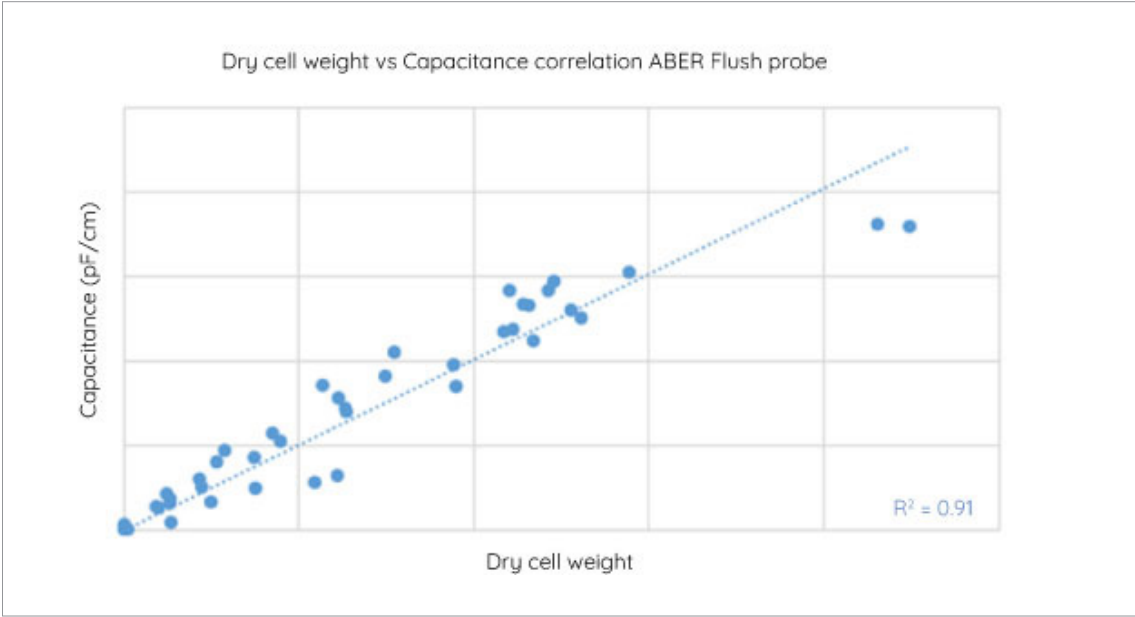
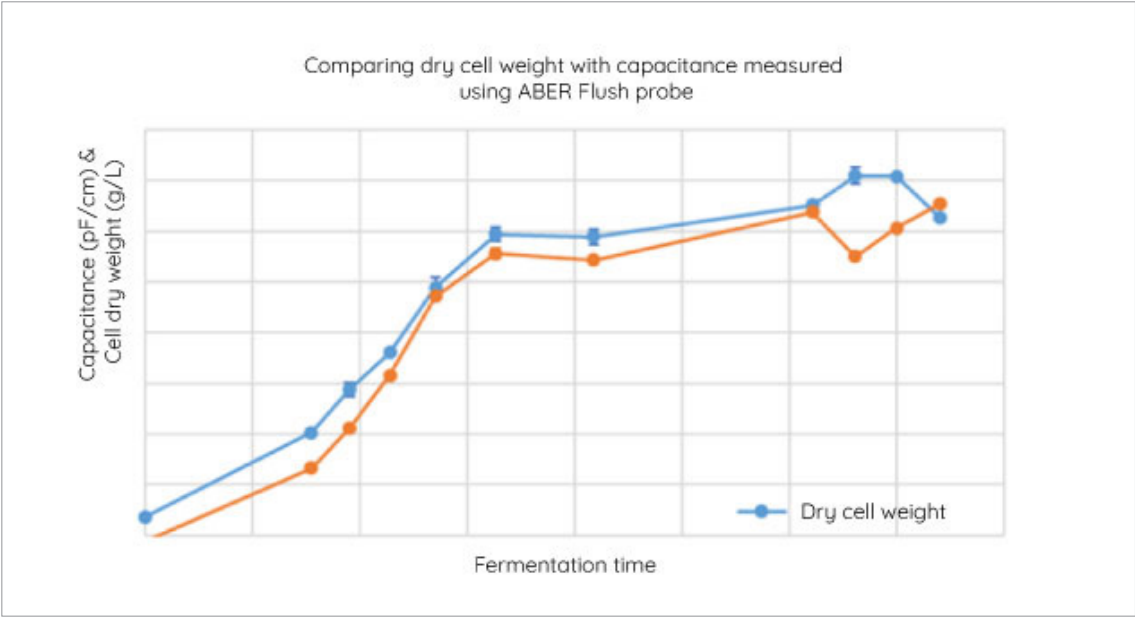
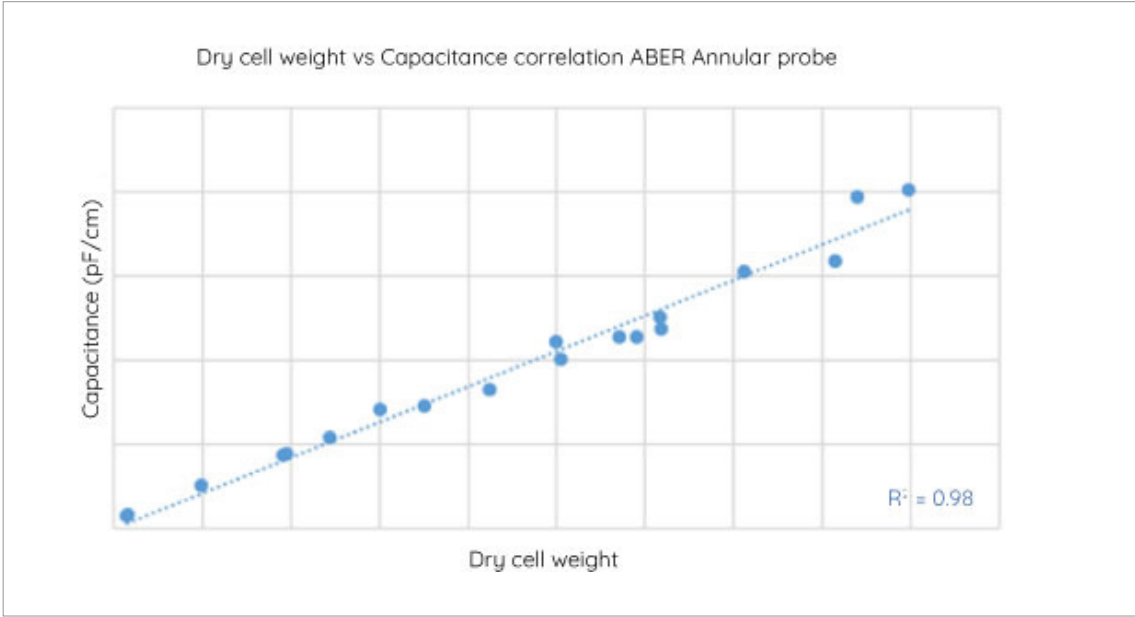
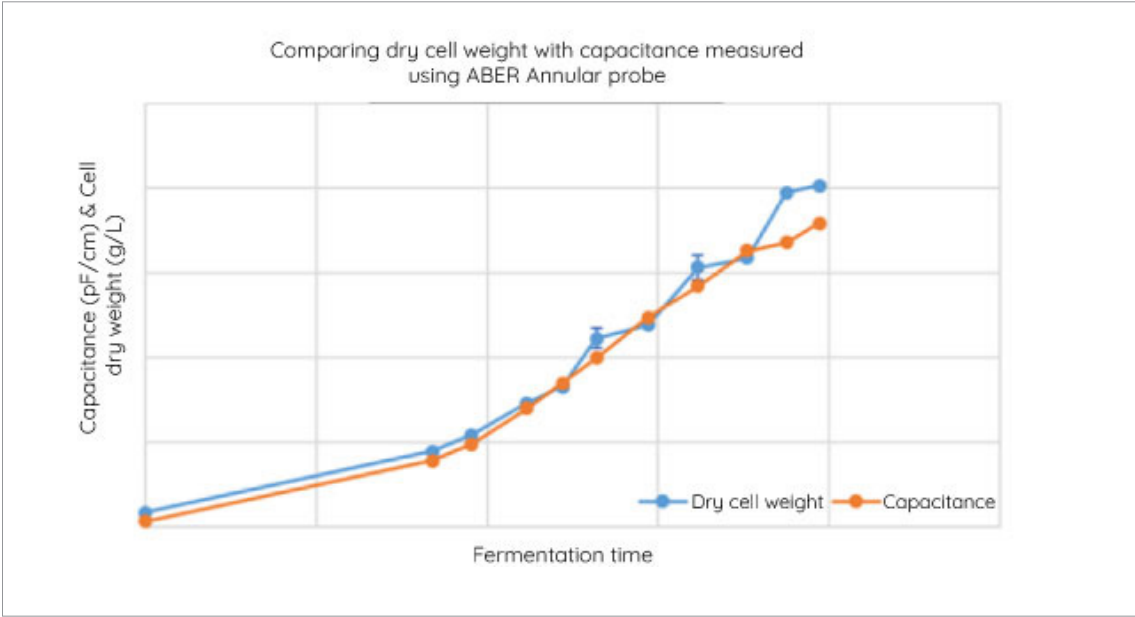


Figure 1 - Time-dependent evolution of the capacitance and concentration of a HeLa cell culture

Data obtained using Aber Annular Probe



Note: The graphs illustrate the capability of the ABER flush/annular probe to monitor fungal biomass

This company (name of company withheld) have shown that for a range of filamentous fungal biomass online capacitance measurements have generated robust, accurate and comparable data for cell mass. Correlations between measured biomass and capacitance were shown to generate R^2 values > 0.9 for both Flush and Annular probes (> 0.98 for the latter). As such the use of Aber's capacitance technology can be used as an immediate, on-line measurement which gives a direct relationship to cell biomass in a fermentation where other online measurements (such as optical density) cannot be employed.

Summary of the benefits:

- Monitor challenging fungal processes using capacitance.
- Allows for continuous in-line monitoring of fungal growth.
- Excellent correlation between inline capacitance and offline cell dry weight.
- Obtain a real time fingerprint of the process.
- Real time profile can be used to optimize nutrient feed, troubleshooting, and controlling critical events during the process.

For further technical information please contact:

support@aberinstruments.com

or alternatively contact sales@aberinstruments.com