Title: Mechanistic Modelling of Chinese Hamster Ovary (CHO) cell Continuous Clarification using Acoustic Wave Separation Technology

Abstract: Acoustic wave separation (AWS) is gradually emerging as an effective method for continuous clarification of Chinese hamster ovary (CHO) cells. In this paper, we present a mechanistic model for AWS based on population balance model (PBM) along with acoustic agglomeration kernel to predict cell size distribution as a function of time. Results show that more than 90% CSE was achieved for flowrates < 5 mL min^{-1} and acoustic power >12.5 W. Experimental results confirm that the mechanistic model offers an accurate prediction of the CHO agglomeration process. Furthermore, a generalized correlation has been developed using the Buckingham Pi theorem between the dimensionless numbers composed of relevant process and geometrical variables to predict the agglomeration efficiency. To our knowledge, this is the first such study to model the agglomeration dynamics of CHO cells in acoustic standing waves.