

# **Construction and Development of Small Scale Bioreactor System for Cell Culture Cultivation Processes**

*Pablo Pino Grace, Institute of Bioprocess Engineering and Pharmaceutical  
Technology University of Applied Sciences Mittelhessen, Giessen, Germany;  
Dominik Krienke, Institute of Bioprocess Engineering and Pharmaceutical  
Technology University of Applied Sciences Mittelhessen, Giessen, Germany; Denise  
Salzig, Institute of Bioprocess Engineering and Pharmaceutical Technology  
University of Applied Sciences Mittelhessen, Giessen, Germany; Peter Czermak,  
Institute of Bioprocess Engineering and Pharmaceutical Technology University of  
Applied Sciences Mittelhessen, Giessen, Germany, Department of Chemical  
Engineering, Kansas State University, Manhattan KS, USA*

The transfer from static cultivation (performed in 6-wells or T-flasks) to dynamic systems like stirred tanks or spinner flasks is one of the most important steps in developing new processes on cell culture. Normally the range of laboratory scale reactors goes from 1 to 15 liter. Recently, several small scale bioreactors have been developed covering the range of 250 to 1000 ml. This paper deals with the development and construction of a small bioreactor system employing three parallel cultivation tanks, a control unit, and novel on-line PAT tools like impedance spectroscopy and a supplementary fixed bed bioreactor. This system generates more data and scalable results in less time and reduces expensive cost of media. Additionally it allows the application of disposable tanks. We demonstrate the performance of this parallel bioreactor system through experimental investigations on hMSC-TERT stem cells cultivation.