

생물학적 공정을 위한 비선형 공정모니터링과 품질예측모델링

유창규*

경희대학교 환경응용화학대학

(ckyoo@khu.ac.kr*)

Bio-monitoring the process status and modeling the input-output relationships of biological process are interested in the biotechnology industries which have usually noisy, high dimensional, correlated and nonlinear characteristics. In this paper, a new nonlinear process monitoring and quality prediction technique based on kernel partial least squares (KPLS) is developed. In comparison to other nonlinear PLS techniques, KPLS requires only the solution of an eigenvalue problem in the feature space and does not entail any nonlinear optimization. The guidelines to select the number of eigenvalue in the feature space and to calculate the process monitoring index in the feature space are also discussed. The KPLS model enables us to model and monitor any nonlinear biological process. Based on nonlinear modeling and monitoring statistics in the feature space, KPLS was applied to predict the in the industrial biological process. The proposed method showed superior extrapolation capability and denoising performance and also process monitoring performance compared to other nonlinear ones as well as linear since it can effectively capture the nonlinear causal relationship in the biological process.