

國立中山大學應用數學系

學術演講

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講題：Shelf-Life Prediction of Nano-Sol Products
via pH Acceleration

時間：2018/05/03（星期四）14:10 ~ 15:00

地點：理學院四樓理 SC 4009-1 室

茶會：15:00 於理 SC 4010 室（系辦公室）

摘要

Nano-sols have been extensively researched and applied in diverse areas including products in optoelectronic, energy storage, pharmaceutical devices, as well as processes such as chemical mechanical polishing, 3-D printing etc. However, there is very little study on the shelf-life predictions on such a product. It is well known that nano-particles tend to aggregate and become large particles. Therefore, the evolution of particle size distribution will play an important role for determining the shelf-life of nano-sol products. In this study, we first presented experimental results and dynamic light scattering was used to measure the particle size distributions. Two approaches are proposed to model the particle-size distribution, by using either a parametric approach (mixture-normal distribution) or a non-parametric (distribution free) approach. In some nano-sol applications (such as chemical mechanical polishing), the distribution should follow a mixture normal distribution. However, simple and intuitive nonparametric models are often used in reliability studies. It is therefore necessary to have an analytical study on the accuracy and precision of the shelf-life prediction if the true particle-size follows a parametric mixture-normal distribution, but wrongly treated as a distribution free model. For the given dataset, the shelf-life prediction may be under-estimated by up to 13.66%, while its relative variation may be inflated up to 13.35 times by using a non-parametric approach. (This is a joint work with Prof. Wong, D-H-S and Dr. Yao, Y-C)

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