

## 抄紙系統中的界面電動現象及 Zeta 電位控制

蘇裕昌\*

### Electrokinetic Phenomenon and Zeta Potential Control in a Paper Making System

Yu-Chang Su\*

Colloidal particles, such as fines, fillers, and sizing etc. in papermaking system exhibit electrokinetic phenomenon that lead to charges on particles surfaces called zeta potential. The potential is related to the agglomeration and flocculation of the particles. Thus it impacts retention, white water treatment, paper quality, drainage characteristics, transport of stock, and pitch trouble directly. In order to raise retention and improve drainage, retention aids and other electrolytes are often used to control particle charges. Zeta potential is a critical factor in controlling colloidal particle behavior and it is receiving due recognition by researchers and mill personnel. Adequate control of the particle charge properties could improve productivity, product quality, resource use and environment.

#### 一、緒言

抄紙系統中除大部分為纖維外另外含有多量的微細纖維、填料、上膠劑等微細粒子，由於這種膠羽粒子（Colloidal particles）在系統中的界面電子動力學現象（Electrokinetic phenomenon）會使粒子表面荷電，而使粒子表面有 Zeta 電位之形成，這種 Zeta 電位與粒子間的凝集及凝聚有關，不僅與原材料的留存有關而且與白水處理、紙質改良、濾水性改善、漿液的輸送、樹脂障礙的形成均有直接的相關（田中浩雄, 1998）、（Wintwers, 1998）、（山田博, 1987, 1988）。為提升抄紙機留存、改善濾水性及使微細粒子與長纖維結合而留存於紙上常使用留存助劑及其他電解質用以控制各成分之表面電位等手法，促使微粒子間或

與長纖維間產生凝聚、或使其凝聚體粗大化而留存於紙上。Zeta 電位對這種微細粒子的舉動關係很大，且為重要的影響因子，已經廣為造紙研究人員及現場技術人員所重視，並有相當多的應用。如果控制得當除了達到生產性的提升製品品質的維持改善外，對資源的有效利用及環境對策均有正面的提升效果（蘇裕昌, 1999a, 1999b, 2001）。