Applications of Nano-sericite to Coated Paper

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ABSTRACT

Taking advantage of the swelling nature of sericite, a mica mineral, in this study, we applied a nano-preparation of it as a coating color ingredient to papermaking. The preparation was also added to the coating binder, styrene butadiene resin (SBR) to modify its flow properties. Furthermore, we integrated the results of our lab findings in recent years to ascertain the role of nano-sericite in paper coating operations, and attempted to develop functional paper usages based on the results of its effects on coating color and coated papers. The purpose of the study was to understand the feasibility of applying nano-sericite to paper coating operations. The material was used both as a pigment ingredient, as a modifier of SBR, examined the heated performance of modified SBR, and investigated the rheological characteristics of coating color on the coating operations. The experimental results included an analysis of the coating color properties, optical and printability properties of the coated paper, and verified the feasibility of applying nano-sericite to paper coating uses. The color properties examined included the solids content, low- and high-shear viscosities, water retention value (WRV) and pH. The optical properties of the coated paper examined included the brightness, opacity, CIE L*a*b* values, gloss, smoothness and roughness; the printability properties examined included RI dry-peeling, wet-peeling strengths, and IGT printed gloss. The studied was conducted in 4 phases as described above. The results indicated that the WRV increased with the stepwise increments of nano-sericite addition; in other words, the water retained by the color decreased. In particular, the SBR-130 nm group had WRV increases significantly greater than did those of SBR-185 and SBR-120 nm groups. The low-shear viscosities of the colors also increased with increasing proportions of nano-sericite added. When nano-sericite was added as a pigment ingredient, at 1% dosage, its effects on WRV and low-shear viscosity were maximized. Overall, addition the swelling nano-sericite decreased the retained water in the color and coalesced pigment particles to cause increased low-shear viscosity.

Keywords : nano-sericite ; coating ; binder ; optical properties ; printability ; styrene butadiene resin

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REFERENCES

王秀華、林曉洪、蔡明修 (2005)，SA乳膠之製備及其對輕塗紙印刷適性之影響，中華林學季刊， 38(1):107-117。 王秀華、黃貞甄、林曉洪、彭元興 (2003)，陽性澱粉對輕量塗布紙品之改善效應，臺大實驗林研究報告， 17(2):97-106。 石大鑫 (1992)，中國大陸之雲母與石棉，礦業技術，30:2-19。 申豐化學工業股份有限公司 http://www.shinfoong.com.tw/ 汪昱甫 (2007)，奈米塗布紙張表面性質在數位印刷適性分析研究，碩士論文，台灣藝術大學圖文傳播藝術學系。 林曉洪、賴仁堯、王秀華 (2005)，奈米化塗料級絹雲母顏料研磨之探討，中華林學季刊， 39(2):93-102。 林曉洪、賴仁堯、王秀華 (2006)，奈米級絹雲母顏料在輕量塗布紙之應用，中華林學季刊，39(3):389-407。 林鴻明 (2001)，奈米材料未來的發展趨勢，大同大學材料工程學系內部資料，大同大學材料工程學系。 吳景雅 (2000)，向陽絹雲母之離子性質交換研究，碩士論文，成功大學資源工程研究所。 陳仕宏 (2001)，向陽絹雲母之粒徑縮減研究，碩士論文，成功大學資源工程研究所。 陳鴻銘 (2001)，紙塗布技術高分子合成乳膠的應用，高立圖書有限公司，p 268-305。 彭元興 (2005)，塗布用接著劑及塗布助劑，經濟部工業局工業技術人才培訓計畫，p 101-147。 森田修二 (1962)，土壤學汎論，養賢堂出版社，p. 296-302。 黃永盛 (1995)， SEM/EDS與FIB的原理及其在半導體工業的應用，科儀新知，17(3):36。 黃貞甄 (2002)，SB乳膠對輕塗紙性質之影響，碩

士論文，國立屏東科技大學森林系。 黃秋華 (2007)，塗布用黏著劑及塗布助劑，聚和國際股份有限公司內部資料。 黃秋華 (2006)，塗布紙的製造，聚和國際股份有限公司內部資料。 盧俊嘉 (2002)，含絹雲母塗布紙之性質，碩士論文，國立中興大學森林學系。 謝文展 (2007)，絹雲母奈米製程開發，碩士論文，大葉大學環境工程學系。 蔡明修 (2004)，丙烯酸系及苯乙烯丁二烯乳膠之配合對輕塗紙印刷適性之影響，碩士論文，國立屏東科技大學木材工業系。 蕭朝光 (2003)，向陽絹雲母粒徑縮減及晶格離子置換研究，博士論文，成功大學資源工程。 蘇裕昌 (2001)，塗布紙概說，漿紙技術，5(3):1-5。 Breeau WH. 1983. What the printer should know about paper. 2nd.Endtion. Canada: Gatfpress. Perng YS, Wang IC, Lu, CC Kuo LS. 2006. Performance of sericite as a pigment for coating paper. Appita J. 59(5):378-390. Perng YS, Wang IC, Lu CC, Kuo LS. 2006, February. Application of Sericite to LWC Coating Formulation, 2006 TAPPI Advanced Coating Fundamentals Symposium. Finland, Turku. Perng YS, Wang IC, Lu CC, Kuo LS. 2008. Application of sericite to LWC coatings. Tappi J. 7(6):21-26. Lee RE. 1993. Scanning electron microscopy and x-ray microan alysis. New Jersey : PTR Prentice Hall.