

## ORIGINAL ARTICLES

EVALUATION OF TACTILE SENSATION FOR FABRICS  
OF VARIOUS FIBER FINENESSMika MORISHIMA\*<sup>1</sup>, Akira MORIKAWA\*<sup>1</sup>, Yoshio SHIMIZU\*<sup>1</sup>,  
Masayuki TAKATERA\*<sup>1</sup>, Hiromi GOCHO\*<sup>2</sup> and Eiichiro JOJIMA\*<sup>3</sup><sup>1</sup>Course of Bioscience and Textile Technology, Graduate School of Science and Technology, Shinshu  
University, 3-15-1 Tokida, Ueda, Nagano 386-8567, Japan<sup>2</sup>Seitoku Junior College of Nutrition, 1-4-6 Nishishinkoiwa, Katsushika-ku, Tokyo 124-8530, Japan<sup>3</sup>Department of Human Environmental Sciences, Jissen Women's University, 4-1-1 Oosakaue, Hino, Tokyo 191-8510, Japan

**Abstract:** Tactile sensation for four nylon6 satin fabrics of different fiber fineness has been examined. Four grades of fineness of the fibers were employed as 0.74(micro-fiber), 1.4, 4.4, and 56 dtex. Several tactile adjectives effective to express tactile sensation were selected by means of factor analysis for questionnaire data. The tactile adjectives selected were related to feeling and sense to heat and moisture. The evaluation data for tactile sensation of fabrics were analyzed by paired comparison method using the selected adjectives. It is stressed that the correspondence of tactile sensation to physical properties of the fabrics was observed for fiber fineness of about 1dtex or more. It has been further clarified in the present work that the micro fiber fabric shows a specific tactile sensation compared with normal fiber fabric.

**Keywords:** micro fiber, sensory test, tactile sensation

## 1. INTRODUCTION

Fibers with fineness larger than 1dtex are generally appointed by "normal fiber" and smaller than 1 dtex by "micro fibers". Micro fibers are used for making silk-like fabrics, leather-like cloths, and waterproof material, etc. The products of direct touch to skin, such as under wear and diaper are intensively developed using micro fibers. In order to impress the tactile image of the products to customers, manufacturers use terms like "Soft", "Smooth", and "Velvety", etc. In general, the evaluation of tactile sensation is performed for every individual fiber product using the special terms. When several terms, which are common and effective to evaluate tactile sensation for various fabrics are defined, the degree of the sensation can be expressed by the terms as a general scale and correlated to the properties of the fibers of fabrics through the use of the terms. However, in the researches until present, the fiber products are not systematically evaluated taking account of fiber fineness and tactile sensation. Therefore, the present authors try to clarify the relation between the fiber fineness and the feeling for fabrics with various fiber fineness.

In the present research, four kinds of fabrics with different fiber fineness, were prepared to investigate the effect of fiber fineness on tactile sensation, and supplied to examine how people perceive the fabric features through

tactile sense [1,2]. Furthermore, the correspondence of the tactile sensation perceived for the nylon6 satin fabrics to their physical properties will be clarified.

## 2. EXPERIMENTS

### 2.1. Home-made Fabric samples

Four kinds of weft satin fabric were made of 220 dtex nylon6 yarn of filament with different fiber fineness by Repia weaving machine (110 ER type 80). The warp yarn of 300dtex polyester was commonly used for the fabrics. The yarn densities in both warp and weft are 24cm<sup>-1</sup>. The fabrics were preliminarily washed by hexane, benzene, methanol, and ion exchange water [3]. Fig.1 shows SEM photograph of the fabrics. Sample codes for the fabrics, fiber fineness, average diameter of fiber, thickness and mass per unit area of fabrics are collected in Table1. The micro fiber fabric is denoted by n09, and the normal fiber fabrics by n14, n24, n82. Because the nylon6 fiber cross-section was circle, the average diameters were calculated from the measurements of thickness for 500 places on the side view of the fibers. According to JIS L 1096, the thickness (Shimazu Rika Kikai Co.Ltd., thickness gauge CR-10A, load 1.96kPa) and mass per unit area of the fabrics were measured at 20°C, 65%R.H.