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APPENDIX

APPENDIX A

CURVE FITTING

METHOD OF XPS SPECTRA

In this thesis, we have used origin7.5 software for curve fitting process to obtain the resolving overlapping peaks in the spectra of C 1s high resolution XPS scan. The number of peaks represents the number of suspected functional groups presented on the fabric. For example, the PET structure contains three different types of carbon atom as showed in Fig. 5.20 such as C1 corresponding to carbon bounding in aromatic ring (C-C/C-H), C2 corresponding to methylene carbons singly bounded to oxygen atom (C-O), and C3 corresponding to carbons in the ester group (C=O). From literature, we can be assigned the position of C1, C2, and C3 at binding energy 284.7, 286.6, and 288.5 eV, respectively. The summary of functional groups and their binding energies used in this thesis are showed in Table A.1. To fit curve by using origin7.5 software with multiple peaks can perform as the following,

- 1) From the manu, select **Analysis: Fit Multi-peaks: Gaussian**.

The manu command shows **Number of peaks** dialog box.

- 2) Enter the number of peaks which represents the number of functional groups presented on the fabric, e.g. three peaks for untreated PET fabrics.

- 3) Click **OK** to close the dialog box.

The manu command shows the **Initial Haft with Estimate** dialog box. The origin estimates the overall half-width through integration and then divides

by the number of peaks, to arrive at the half-width estimate.

4) Accept the estimated value in the **Initial Haft with Estimate** dialog box.

5) Click **OK** to close the dialog box.

6) To determine the position of peak (peak center), **Click+Enter** on each of data point, e.g. untreated PET fabric **Click+Enter** at binding energy 284.7, 288.6, and 288.5 eV.

When the process completes, the resolving overlapping peaks, the fitting parameters e.g. the center and area of each peaks, as well as related statistics are displayed in the graph window. The quality of the fitting is determined by a non-linear least-square optimization method of which the value closes to 1 represented the best fit the data points. The concentration of elements on the fabric surface is determined by measuring the areas under the resolving overlapping peaks, e.g. the F/C and O/C atomic ratios are determined by measuring the areas under F 1s resolved peak divided by areas under C 1s resolved peak and of which O 1s resolved peak divides by areas under C 1s resolved peak, respectively. In the case of treated PET fabric with SF₆ plasma, the resolving overlapping peaks can be obtained similarly with untreated PET fabric, but the number of peaks of treated PET fabric contains six peaks, which all three peaks (C1, C2, C3) for untreated remained evident, three new peaks can be assigned to CF, CF₂, and CF₃ at binding energy 289.1, 291, and 293 eV, respectively.

Table A.1: C 1s binding energy in PET, mixed Thai silk, Thai silk and cotton fabrics with functional groups.

Functional group	Binding energy (eV)
C-C/C-H	284.7
C-N	286
C-OH	286.2
C-O	286.6
C-O-C	287.2
C=O	288.5
C-CF	289.1
C-CF ₂	291
C-CF ₃	293

VITAE

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Conference Presentations

International Presentations:

T. Supasai, and B. Paosawatyanong. FABRIC PROPERTIES MODIFICATION SYSTEM USING CHEMICAL VAPOR DEPOSITION. *The 1st Mathematics and Physical Science Graduate Congress*, Chulalongkorn University, Bangkok (6-7 December 2005) Code: E07

T. Supasai, S. K. Hodak and B. Paosawatyanong. FABRIC AND FIBER MODIFICATION USING RADIO FREQUENCY PLASMA PROCESS. *2nd Mathematics and Physical Science Graduate Congress*, National University of Singapore (11-15 December 2006) Code: P11

Local Presentations:

T. Supasai, S. K. Hodak and B. Paosawatyanong. FABRIC AND FIBER MODIFICATION USING RADIO FREQUENCY PLASMA PROCESS. *The First National Symposium on Physics Graduate Research*, Chulabhorn Dam, Chiya-phum (29 June - 1 July 2006) Code: IBPP01

T. Supasai, S. K. Hodak and B. Paosawatyanong. SURFACE MODIFICATIONS TO IMPROVE HYDROPHOBICITY OF COTTON BY SF₆ PLASMA TREATMENT. *Siam Physics Congress 2007*, The Rose Garden Riverside Nakorn Pathom, Thailand (22-24 March 2007)

Publications:

B. Paosawatyanong, T. Supasai, V. Pavarajarn, and S. K. Hodak, Hydrophobicity improvement of PET fabrics after SF₆ plasma treatment, *International Polymer Processing (inrevision)*