

# POSTER

## STRUCTURES AND PROPERTIES OF MICROPOROUS CARBON FILMS

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### INTRODUCTION

Recently new microporous carbons of various morphologies such as fiber, bead, and film have been developed[1-3]. However, studies on the self-supported microporous carbon film is less-advanced. The carbon film of the orientational structure was prepared from the polyimide film (Kapton) about twenty years ago[4]. The physical properties and structures of the graphitic carbon film from the Kapton were actively studied by some groups[5-6]. However, the activated carbon film from the Kapton is not reported yet. In this paper we describe the self-supported microporous carbon film from the Kapton.

### EXPERIMENTAL

The Kapton film in 0.025 mm thickness

was used in this study. The Kapton film was heated at 1073 K during various durations until 10 h in a stream of CO<sub>2</sub>. The heated sample was designated F-T-t, where T and t represent the activation temperature and the activation time, respectively.

The obtained carbon films were characterized by N<sub>2</sub> adsorption, the X-ray diffraction, and their electrical properties were examined with Q-meter.

### RESULTS AND DISCUSSION

The Kapton film was carbonized and activated through heating at high temperature.

The N<sub>2</sub> adsorption isotherms of all self-supported samples were of Type I. The adsorption isotherms were analyzed by the

$\alpha_s$ -plots using the standard data of nonporous carbon black[7]. The  $\alpha_s$ -plots are shown in Fig.1. The  $\alpha_s$ -plots of F-1073-5 and F-1073-10 have a marked upward deviation from the linearity at low  $\alpha_s$ -region. Both samples have abundant micropores, while F-1073-1 has only slight amount of narrow micropores. The specific surface area  $a_s$ , the external surface area  $a_{ext}$ , micropore volume  $V_0$ , and pore width  $w$  were determined by the  $\alpha_s$ -plot are summarized in Table 1. All pore parameters become greater with the activation time. Thus, activation with  $CO_2$  is quite effective for production of micropores.

The prepared self-supported microporous carbon films were examined by low incident X-ray diffraction. The diffraction pattern indicated a clear orientation of

micrographitic structures in this carbon film.

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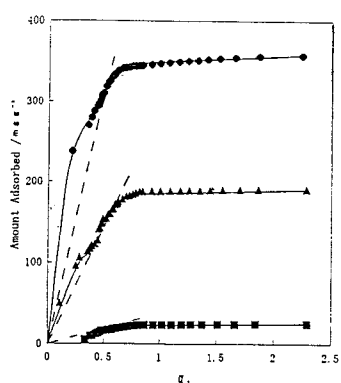


Fig.1  $\alpha_s$ -plots of carbon films  
 ■: F-1073-1 ▲: F-1073-5 ●: F-1073-10

Table 1 The microporoe structural parameters of carbon films

	F-1073-1	F-1073-5	F-1073-10
$a_s$ ( $m^2g^{-1}$ )	65	575	1200
$a_{ext}$ ( $m^2g^{-1}$ )	2	6	20
$V_0$ ( $cm^3g^{-1}$ )	0.03	0.24	0.43
$w$ (nm)	0.72	0.80	0.90