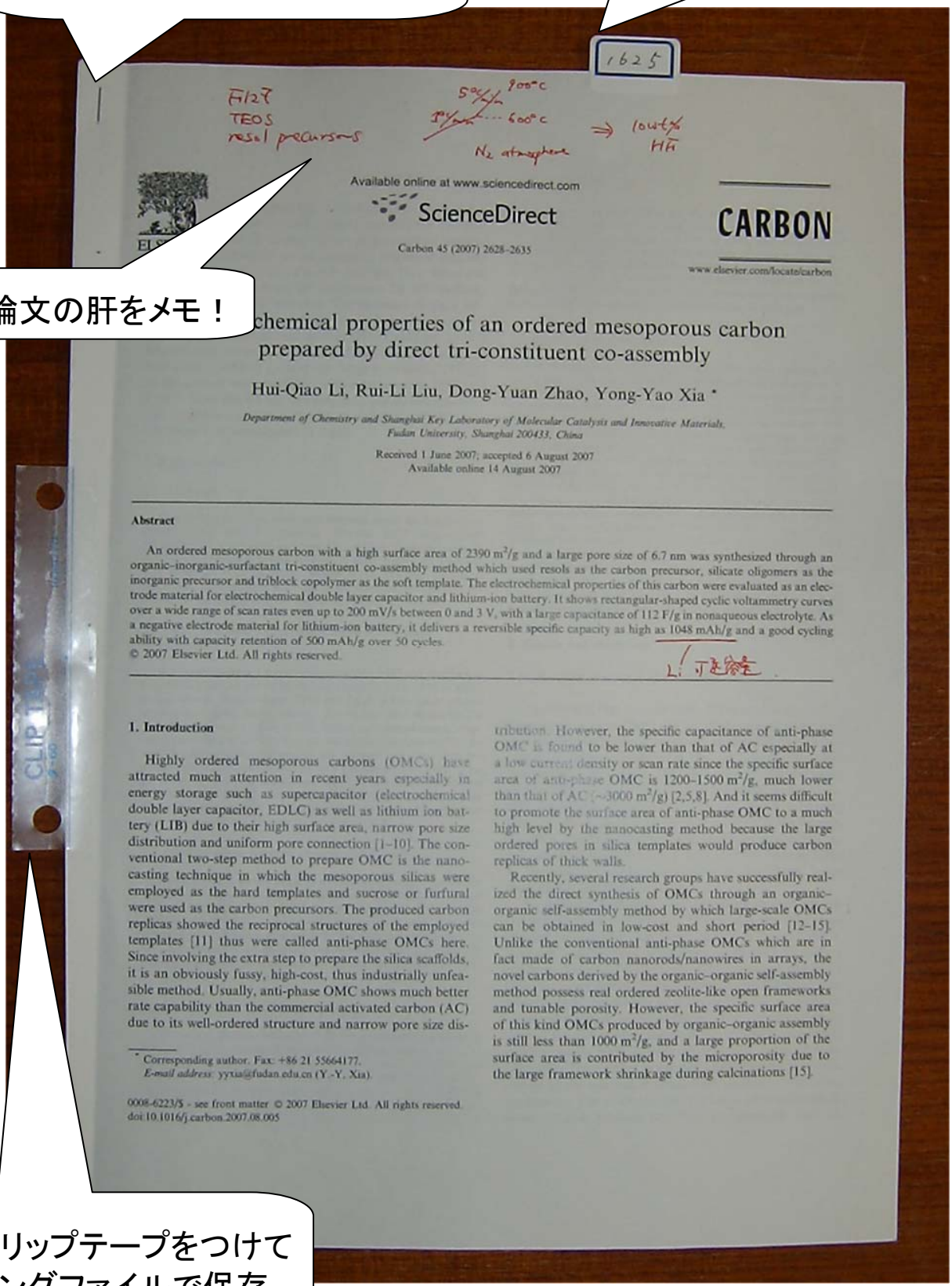
ホッチキスで左側3ヶ所くらい
とめ、雑誌スタイルにまとめる

ラベルをつけシリアル
番号を記入

論文の肝をメモ！

クリップテープをつけて
リングファイルで保存


1625

F127
TEOS
resol precursors

5%/h 900°C
1%/h ... 600°C
N2 atmosphere
⇒ 10wt% HF

Available online at www.sciencedirect.com
ScienceDirect
Carbon 45 (2007) 2628–2635
CARBON
www.elsevier.com/locate/carbon

chemical properties of an ordered mesoporous carbon prepared by direct tri-constituent co-assembly

Hui-Qiao Li, Rui-Li Liu, Dong-Yuan Zhao, Yong-Yao Xia *

Department of Chemistry and Shanghai Key Laboratory of Molecular Catalysis and Innovative Materials, Fudan University, Shanghai 200433, China

Received 1 June 2007; accepted 6 August 2007
Available online 14 August 2007

Abstract

An ordered mesoporous carbon with a high surface area of 2390 m^2/g and a large pore size of 6.7 nm was synthesized through an organic–inorganic-surfactant tri-constituent co-assembly method which used resols as the carbon precursor, silicate oligomers as the inorganic precursor and triblock copolymer as the soft template. The electrochemical properties of this carbon were evaluated as an electrode material for electrochemical double layer capacitor and lithium-ion battery. It shows rectangular-shaped cyclic voltammetry curves over a wide range of scan rates even up to 200 mV/s between 0 and 3 V, with a large capacitance of 112 F/g in nonaqueous electrolyte. As a negative electrode material for lithium-ion battery, it delivers a reversible specific capacity as high as 1048 mAh/g and a good cycling ability with capacity retention of 500 mAh/g over 50 cycles.

Li 可逆容量

1. Introduction

Highly ordered mesoporous carbons (OMCs) have attracted much attention in recent years especially in energy storage such as supercapacitor (electrochemical double layer capacitor, EDLC) as well as lithium ion battery (LIB) due to their high surface area, narrow pore size distribution and uniform pore connection [1–10]. The conventional two-step method to prepare OMC is the nanocasting technique in which the mesoporous silicas were employed as the hard templates and sucrose or furfural were used as the carbon precursors. The produced carbon replicas showed the reciprocal structures of the employed templates [11] thus were called anti-phase OMCs here. Since involving the extra step to prepare the silica scaffolds, it is an obviously fussy, high-cost, thus industrially unfeasible method. Usually, anti-phase OMC shows much better rate capability than the commercial activated carbon (AC) due to its well-ordered structure and narrow pore size distribution. However, the specific capacitance of anti-phase OMC is found to be lower than that of AC especially at a low current density or scan rate since the specific surface area of anti-phase OMC is 1200–1500 m^2/g, much lower than that of AC (~3000 m^2/g) [2,5,8]. And it seems difficult to promote the surface area of anti-phase OMC to a much high level by the nanocasting method because the large ordered pores in silica templates would produce carbon replicas of thick walls.

Recently, several research groups have successfully realized the direct synthesis of OMCs through an organic–organic self-assembly method by which large-scale OMCs can be obtained in low-cost and short period [12–15]. Unlike the conventional anti-phase OMCs which are in fact made of carbon nanorods/nanowires in arrays, the novel carbons derived by the organic–organic self-assembly method possess real ordered zeolite-like open frameworks and tunable porosity. However, the specific surface area of this kind OMCs produced by organic–organic assembly is still less than 1000 m^2/g, and a large proportion of the surface area is contributed by the microporosity due to the large framework shrinkage during calcinations [15].

* Corresponding author. Fax: +86 21 55664177.
E-mail address: yyxia@fudan.edu.cn (Y.-Y. Xia).

0008-6223/$ - see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.carbon.2007.08.005

ホッチキス、ラベル、クリップテープ、リング
ファイルは配布します。

パソコンにラベルにつけた番号、論文著者、タイトル、雑誌名、巻、ページ、年とキーワードなどを保存。(データーベースソフトがあればそれを利用すればよいが、ただのテキストふぁいるでも十分である。)

list14.txt - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
[KAWA-14]
J.P.Itie,A.Polian,G.Calas,J.Petiau,A.Fontaine,H.Tolentino.
Pressure-induced coordination changes in crystalline and vitreous GeO2.
Physical Review Letters, 63, 398 - 401 (1989)
<Keywords> EXAFS, XANES, DAC, hexagonal geo2

[KAWA-15]
K. Suito, M. Miyoshi and T. Sasakura, H. Fujisawa.
Elastic properties of obsidian, vitreous SiO2 and vitreous GeO2 under high pressure up
to 6 GPa.
High Pressure Research, ,  -  (1992)
<Keywords> Ultrasonic, elastic wave, bulk modulus

[KAWA-16]
T. Yamanaka.
Crystal structure analysis by fitting of powder diffraction data on energy dispersion.
Proceedings of the international conference, ,  -  (1992)
<Keywords> Proceedings of the international conference Accuracy in powder diffraction
II

[KAWA-17]
G. S. Smith and P. B. Isaacs.
The crystal structure of quartz-like GeO2.
Acta Cryst., 17, 842 - 846 (1964)
<Keywords> geo2, quartz

[KAWA-18]
G. H. Wolf, S. Wang, C. A. Herbst, D. J. Durben, W. F. Oliver, Z.C Kang and K.
Halvorson.
Pressure induced collapse of the tetrahedral framework in crystalline and amorphous
GeO2.
High Pressure Research, ,  -  (1992)
<Keywords> geo2, TEM, raman, brillouin scattering

[KAWA-19] J. D. Jorgensen
J.D. Jorgensen.
Compression mechanism in a-quartz structures--SiO2 and GeO2.
Journal of Applied Physics, 49, 5473 - 5478 (1978)
<Keywords> geo2, neutron diffraction, high pressure
```

研究初めのころは論文数もたかがしれているので、すぐにどの論文がどこにあるか思い出せるが、だんだん増えていくので、きちんと整理しておくことが望ましい。