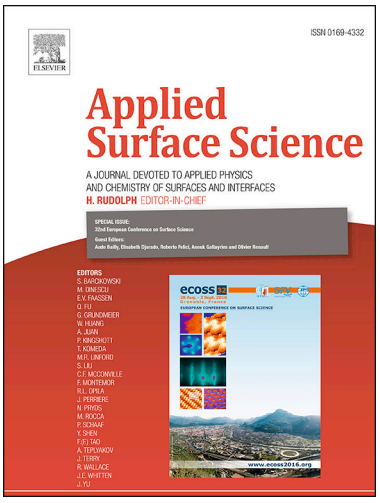

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B. Zhou, C.Y. Li, N. Qi, M. Jiang, B. Wang, Z.Q. Chen

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Pore structure of mesoporous silica (KIT-6) synthesized at different temperatures using positron as a nondestructive probe

B. Zhou[a], C. Y. Li[b], N. Qi[a,*], M. Jiang[c], B. Wang[a], Z. Q. Chen[a,**]

[a]*Hubei Nuclear Solid Physics Key Laboratory, Department of Physics, Wuhan University, Wuhan 430072, China*
[b]*College of Electric Power, North China University Of Water Resources And Electric Power, Zhengzhou, 450045, China*
[c]*Key Laboratory of Neutronics and Radiation Safety, Institute of Nuclear Energy Safety Technology, Chinese Academy of Sciences, Hefei, 230031, China*

Abstract

Ordered mesoporous SiO_2 (KIT-6) was synthesized using triblock copolymer P123 as the structure template and tetraethyl orthosilicate (TEOS, $C_8H_{20}O_4Si$) as silica source. Small-angle X-ray scattering and high resolution electron microscope measurements indicate the 3d cubic Ia3d symmetry of the pore structure of KIT-6 synthesized at 30°C-120°C. When the synthesis temperature increases to 180°C, the order of pores was deteriorated. The pore size was estimated by nitrogen adsorption/desorption measurements, which increases from 3.8 nm to 18.5 nm as the synthesis temperature increases from 30°C to 180°C. With the increase of mesopore size, the pore wall thickness shows continuous decrease. Positron annihilation lifetime spectra was measured for the synthesized KIT-6. The lifetime spectra can be resolved to two short and two long lifetime components. The two long

*Corresponding author, email: ningqi@whu.edu.cn
**Corresponding author, email: chenzq@whu.edu.cn