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溶胶-凝胶法制备碳纳米管/SiO₂复合材料过程的TG-DSC-MS研究

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摘要 利用热重-差示扫描量热-质谱(TG-DSC-MS)联用技术对溶胶-凝胶(Sol-Gel)法热压烧结制备碳纳米管(CNT)/SiO₂复合材料过程中的热分解行为特性进行了表征研究。采用多离子检测模式测定热分解生成的C⁺(m/z 12)、OH⁺(m/z 17)、H₂O⁺(m/z 18)、CO₂⁺(m/z 28)等9种正离子。实验发现:用溶胶-凝胶法制备CNT/SiO₂复合材料过程中,在500℃以下生成SiO₂,CNT在500~730℃左右氧化燃烧。在500℃条件下煅烧1h,凝胶SiO₂完全转变成玻璃粉。选择在500℃条件下煅烧CNT/SiO₂复合粉体1h可作为CNT/SiO₂复合材料的煅烧工艺

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TG-DSC-MS Characterization for the Carbon Nanotube/SiO₂ Composites by Sol-Gel Method

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Abstract TG DSC MS(Thermogravimetry Differential Scanning Calorimetry Mass Spectrometry)coupling techniques were used to make a simultaneous characterizing study of the behavior for the carbon nanotube(CNT) reinforced SiO₂ composites during the process of thermal decomposition. Nine kinds of expected positive ions such as C⁺(m/z 12), OH⁺(m/z 17), H₂O⁺(m/z 18), CO₂⁺(m/z 28), etc, were measured by multiple ion detection(MID). CNT/ SiO₂ composites were fabricated by hot pressure sintering the mixture powders by rapid sol gel method. The complete combustion of free carbon was presented at the temperature of about 500~730℃. Meanwhile, the preliminary exploration for the thermal decomposition mechanism of CNT/SiO₂ composites has also been done in this work. CNT/SiO₂ composites have been sintered under the temperature of 500℃ for 1h. It would be useful for the preparation of the CNT/SiO₂ composite s.

Key words [mass spectrometry](#) [study on carbon nanotube\(CNT\)-reinforced SiO₂ composites](#) [TG-DSC-MS](#) [Sol-Gel](#)

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