高等学校化学学报 2008, 29(10) 1986-1989 DOI: ISSN: 0251-0790 CN: 22-1131/O6

论文

新型富勒烯*α*-氨基酸的合成及其纳米颗粒水悬液的制备

张静, 王艳霞, 康峰, 彭琦云, 杨新林

北京理工大学生命科学与技术学院, 北京 100081

摘要:

通过1,3-偶极环加成反应合成中间体N-取代的3,4-富勒烯吡咯烷, 利用*α*-氨基与*α*-羧基均被保护的天冬氨酸或谷氨酸的非*α*-羧基与中间体*N*-取代的3,4-富勒烯吡咯烷衍生物的活化羟基进行缩合反应, 产物脱保护后得到了2种新的*α*-富勒烯氨基酸: 富勒烯天冬氨酸和富勒烯谷氨酸. 采用MALDI-TOF质谱、红外光谱、紫外-可见光谱和^{1}H NMR 等方法对它们进行了结构表征. 采用有机溶剂交换法, 制备富勒烯氨基酸纳米颗粒水悬液, 并进行了电镜和表面zeta-电位分析, 结果表明, 此水悬液体系稳定, 颗粒形态大小均一, 在生物医学领域中具有潜在的应用前景.

关键词: 富勒烯*α*-氨基酸 纳米颗粒水悬液 加成反应 缩合反应

Synthesis of Novel Fullerene *α*-Amino Acids and Preparation of Their Aqueous Nanoparticle Suspensions

ZHANG Jing, WANG Yan-Xia, KANG Feng, PENG Qi-Yun, YANG Xin-Lin*

School of Life Science and Technology, Beijing Institute of Technology, Beijing 100081, China

Abstract:

Fullerene has been chemically functionalized by covalent attachment of different adducts onto the parent cage, to improve its solubility in polar organic solvents or to prepare aqueous solutions. This would be helpful for studying the biological activities of fullerene derivatives and their potential application in the biomedical field. *N*-Substituted 3,4-fullero pyrrolidine was synthesized *via* 1,3-dipolar cycloaddition of the azomethine ylide. Aspartic acid and glutamic acid with protected *α*-amino and *α*-carboxyl groups were reacted with the activated hydroxyl group of *N*-substituted 3,4-fullero pyrrolidine, respectively. The products were then deprotected, affording two novel fullerene *α*-amino acids, fullerene aspartic acid and fullerene glutamic acid. Their chemical structures were characterized *via* MALDI-TOF-MS, UV-Vis, FTIR and ^{1}H NMR. Furthermore, the aqueous nanoparticle suspensions of these fullerene amino acids were obtained by the method of organic solvent exchange, characterized by electron microscopy and *zeta*-potential analysis. The nanoparticle sizes of both fullerene amino acids were around 100 nm, with *zeta*-potentials of about 27 mV. The results indicate that these aqueous suspensions were rather stable with considerably homogeneous shape and size of nanoparticles, and thus were worthy of further investigating their potential application in the biomedical field.

Keywords: Fullerene *α*-amino acids Nanoparticle aqueous suspension Addition reaction Condensation reaction

收稿日期 2008-03-31 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

通讯作者: 杨新林

作者简介:

参考文献：

1. Friedman S. H., DeCamp D. L.. J. Am. Chem. Soc.[J], 1993, 115: 6506—6509
2. Pantarottoab D., Tagmatarchisa N., Biancob A., *et al*. Mini-Rev. Med. Chem.[J], 2004, 4: 805—814
3. Bianco A.. Chem. Commun.[J], 2005: 3174—3176
4. Sofou P., Elemes Y., Panou-Pomonis E., *et al*.. Tetrahedron[J], 2004, 60: 2823—2828
5. Scharff P., Risch K., Durov S. S., *et al*.. Carbon[J], 2004, 42: 1203—1205
6. Dhawan A., Taurozzi J. S., Tarabara V. V., *et al*.. Environ. Sci. Technol.[J], 2006, 40(23): 7394—7401
7. Andrievsky G., Klochkov V., Derevyanchenko L., *et al*.. Fullerenes, Nanotubes, and Carbon Nanostructures[J], 2005, 13: 363—371
8. Deguchi S., Rossitza G.A., Tsujii K., *et al*.. Langmuir[J], 2001, 17: 6013—6017
9. Cheng X., Kan A.T., Tomson M.B., *et al*.. J. Chem. Eng. Data[J], 2004, 49: 675—681
10. Hu Z., Guan W.C., Wang W., *et al*.. Cell Biology International[J], 2007, 31: 798—804
11. Yang J., Alemany L.B., Driver J., *et al*.. Chem. Eur. J.[J], 2007, 13: 2530—2545
12. Fortner J. D., Lyon D. Y., Hughes J. B., *et al*.. Environ. Sci. Technol.[J], 2005, 39: 4307—4316

本刊中的类似文章

文章评论

序号	时间	反馈人	邮箱	标题	内容
1	2009-11-16	frsahfkjsdagjk	hsjkafh@sdk.com	ugg boots	Ugg Boots Sale Online Ugg Boots Discount Uggs Di Ugg Ugg Shoes Sa Sale Cheap Ugg Cheap Uggs ugg