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目的別テーマ：有機ナノファイバーの形成と応用に関する研究

１５年度研究テーマ

15-1-2　：有機ゲル化剤を利用する無機ナノファイバー材料の作製に関する研究

ABSTRACT

有機ゲル化剤をテンプレートに使い、ゾル・ゲル重合によりナノファイバーシリカを作製した。重合時に激しく撹拌することにより、長さが１００μmにおよぶ長繊維が形成されコットン様やスポンジ状のナノファイバーシリカを作製した。また、有機成分を含むハイブリッドシリカナノチューブの作製にも成功した。

研究目的

During the preparation of helical nanofibers by sol-gel transcription method, we can know how the chirality transferred from single molecule to the supramolecular structure and then to inorganic or hybrid nanofibers. This will help us understand the origin of the life. And by the finding of the alignment of nanofibers, we can find new properties of aligned nanomaterials. This alignment method will be a new route to create nanomachines.

一年間の研究内容と成果

During the last five months, we have successfully prepared nanofibers and ultrathin membranes by sol-gel transcription method using organogels. And the nanofibers have been aligned (long-range order reach 100 μm) simply by stirring during the preparation procedure. Because the obtained cotton/sponge-like materials show elasticity, they can be used in many fields. By developing sol-gel transcription method, hybrid silica nanotubes (benzene ring in the wall) were obtained. Because the nanotubes were self-organized into helical bundles, this material could be used as stationary phase of the chiral HPLC.

展望

On the first hand, several other hybrids should be prepared, and new functionalized nanofibers will be found. And by removing the organic groups in the wall of the hybrid, new architecture will be found. On the other hand, technique for the alignment of nanofibers should be developed to construct more complicated structure.