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有序的介观尺寸生物**SiO2**针的合成

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摘要 生物体利用生物矿化作用，在有机分子模板上协同合成有种间差异的生物SiO2材料。具有精确形态可控的固态SiO2结构是在蛋白和多糖生物分子诱导下，在水相、中性pH和室温等温和反应条件下形成的，然而，利用化学合成方法，使SiO2的前体分子聚合形成具有一定模式结构的SiO2则需要极端的pH值或表面活性剂诱导。在人工培养条件下施用硅酸钠(Na2SiO3)时，在芦荟植物叶刺内，以细胞壁为模板生物矿化合成微米尺寸有序SiO2材料。X-ray(EDX)能谱分析显示一根硅针中含有Si，O和C元素，表明Si(OH)4吸收进入植物体内后Si-OH与细胞壁多糖和糖蛋白上的羟基(OH)组分，通过界面分子识别、细胞水平调控和再加工作用，聚合形成了有序的无定形(电子衍射确定)SiO2针状结构体。

关键词 二氧化硅 植物矿化 生物材料 矿化作用 芦荟

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Synthesis of ordered mesosized biosilica needles

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Abstract Biomineralizing organisms use organic molecules to generate species- specific mineral patterns. The formation fo solid silica structures with precisely controlled morphologies is directed by proteins and polysaccharides and occurs in water at neutral pH and mbient temperature. Laboratory chemical method, in contrast, have to reply on extreme pH conditions and/or surfactnats to induce the condensation of silica precursors into specific morphologies or patterned structures. Cell wall template-mediated micrometer organized silica structures in leaf spicules of Aloe plant were systhesized when Na2SiO3 was supplied. The composition was estimated by energy dispersive X-ray (EDX) spectra on a scanning electron microscope. All organized structures showe dsilicon, oxygen and carbon peaks, indicating that well defined needles of amorphous silica have been synthesized through molecular recognitions between Si-OH and polysaccharide-OH or glycoprotein-OH of main components of plant cell walls and cellular processing as well.

Key words SILICON DIOXIDE BIOLOGICAL MATERIALS MINERALIZATION ALOE

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