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PDF文档

光合细菌Chromatium vinosum 可溶性氢酶的FTIR谱的研究

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光合细菌Chromatiumvinosum含有一种可溶性氢酶和一种膜结合态氢酶。氧化态可溶性氢酶在红外光谱区(1860-2140cm^{-1})有四个特征吸收峰(2103.7,2086.2,2054.8和1962.5cm^{-1})。其中1962.5cm^{-1}处吸收带的位置与已知的NiFe-氢酶活性中心-CO基团所产生的吸收带位置相近;另外三条吸收带的位置与已知的NFe-氢酶活性中心-CN基团所产生的吸收带的位置相近。以2,6-二氯酚靛酚(DPIP)氧化可溶性氢酶时,四条吸收谱带的位置基本上没有发生变化。可溶性氢酶被$Na_2S_2O_4$充分还原时,-CO基团的吸收带移至1946.8cm^{-1},而-CN基团的三条吸收带中的两条分别移至2076.8cm^{-1}和2093.1cm^{-1}处,另一条则消失了。还原态可溶性氢酶与CO反应后,其红外光谱显示七条吸收带,在-CO基团红外光谱区和-CN基团红外光谱区各产生了两条新的吸收带。研究表明,C.viriosum可溶性氢酶的活性中心的结构类似于其它已知的NiFe-氢酶,但与活性中心金属原子相连的可能包括三个-CN基团和一个-CO基团,结合可溶性氢酶的EPR谱特征,推测C.vinosum可溶性氢酶活性中心的结构可能为Ni(CN)Fe(CN)$_2$(CO)。

STUDIES ON FTIR SPECTRA OF SOLUBLE HYDROGENASE FROM CHROMATIUM VINOSUM

Fourier transform infrared (FTIR) studies of oxidized soluble hydrogenase (SH) from C.vinosum revealed four absorption bands (2103.7, 2086.2, 2054.8 and 1962.5cm^{-1}) in the 1860-2140cm^{-1} region. A strong band at 1962.5cm^{-1} is in the same region as the band due to the intrinsic -CO group bound to Fe in the active site of other NiFe-hydrogenases. The other three bands(2054.8, 2086.3 and 2103.7cm^{-1}) are similar in position to those arising from the stretch vibrations of -CN group in other NiFe-hydrogenase. When the soluble hydrogenase was completely oxidized by 2,6-dichlorophenolindophenol, no band shift was observed. When the soluble hydrogenase was fully reduced by $Na_2S_2O_4$, all the bands shifted. The ν(CO) band shifted to 1946.8cm^{-1}.The other bands moved to 2076.8cm^{-1} and 2093.1cm^{-1}. Addition of CO to the reduced enzyme resulted in changes of both the number and position of the bands. Two new bands (1954.7cm-1 and 1967.7cm-1) were observed in the -CO region, while two new bands (2063.9cm-1 and 2071.7cm-1) showed up in the -CN region.

关键词

Chromatium vinosum; 可溶性氢酶(Soluble hydrogenase); FTIR谱(FTIR spectra)