



发光学应用及交叉前沿

丁二酰化壳寡糖稀土配合物与鲱鱼精DNA相互作用的电化学及光谱学研究

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摘要：采用紫外光谱和循环伏安法，研究了丁二酰化壳寡糖稀土配合物(BCS-La、BCS-Nd)与鲱鱼精DNA之间的作用方式。

BCS-La、BCS-Nd的存在导致Fe(CN)₆^{3-/4-}探针分子峰电流下降，式量电位正移，表明BCS-La、BCS-Nd和探针分子与DNA之间存在竞争性作用；BCS-La和BCS-Nd分子都是通过插入方式与DNA相互作用。在一定的扫描速率范围内(0.01~0.2 V/s)，在BCS-La或BCS-Nd参与的条件下，Fe(CN)₆^{3-/4-}在Au/DNA电极上的反应受吸附控制。BCS-La和BCS-Nd分别使得鲱鱼精DNA的特征峰产生明显的减色效应，最大吸收峰位红移，进一步表明BCS-La和BCS-Nd分别以插入方式与鲱鱼精DNA发生相互作用，导致DNA分子的构象变化。BCS-La与DNA的结合比为： $n(\text{BCS-La}) : n(\text{DNA}) = 2 : 1$ ； $n(\text{BCS-Nd}) : n(\text{DNA}) = 6 : 1$ 。

关键词：丁二酰化壳寡糖 稀土 配合物 鲱鱼精DNA

Interaction of Succinic-oligochitosan Rare Earth Complexes with Herring Sperm DNA by Electrochemical and Spectral Methods

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Abstract: The interaction between succinic-oligochitosan-rare earth complexes (BCS-La and BCS-Nd) and herring sperm DNA was investigated by cyclic voltammetry and UV-Vis spectra. The results indicated as follows. Firstly, the peak current of probe molecule Fe(CN)₆^{3-/4-} at Au/DNA electrodes obviously decreased and the peak potential shifted positively because of the existences of complexes. All above these showed that there was a competitive effect between complexes and probe molecule with herring sperm DNA, which revealed that a binding mode intercalation was interacted between complexes and herring sperm DNA. The reaction of Fe(CN)₆^{3-/4-} at Au/DNA electrodes was controlled by adsorption mechanism in the range of scan rate from 0.01 V/s to 0.2 V/s. Secondly, the absorption intensity of herring sperm DNA decreased with the adding of complexes, and the maximum absorption peak had a red shift, which further illustrated that a binding mode intercalation was interacted between complexes and herring sperm DNA, thus led to the change of DNA conformation. The combining ratio of $n(\text{BCS-La})$ and $n(\text{BCS-Nd})$ with DNA was 2:1 and 6:1, respectively.

Keywords: succinic-oligochitosan rare earth complexes herring sperm DNA

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