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光谱

头发光谱显微成像数据处理分析方法及其应用

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摘要:

随着多通道探测技术、集成显微技术和计算机及分析技术的发展, 红外和拉曼光谱技术及光谱显微成像技术在生物及医学领域得到广泛应用并成为一种向实用化发展的趋势。但是, 要从光谱测量中获得准确、有用的信息需要对光谱及成像数据进行细致、合理的分析。本文工作应用MATLAB软件编程, 结合单谱线分析和多谱线多变量分析的方法, 对健康人和病人头发横截面微观扫描的拉曼光谱数据进行分析, 结果表明, 通过对头发拉曼光谱细致处理和数据分析可以揭示被检测人之间的差异。这项工作是把拉曼光谱成像技术及相关光谱分析方法应用于生物医学领域的一个实例。

关键词: 光谱学 生物光谱 主成分分析 光谱显微成像

Human hair analysis based on data obtained from Raman  
microspectroscopy and imaging experiment

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Abstract:

With the fast progress in multi-channel detection technology, integrated microscopy and data acquisition together with analysis methods, the technology of infrared and Raman spectroscopy has been intensively and extensively applied in biological and biomedical fields. In this work, Raman microspectroscopy and imaging was applied to examine human hair samples which were retrieved from both healthy persons and cancer patients. Through MATLAB programming, we used multivariate statistical analysis methods such as principal component analysis (PCA), hierarchical clustering analysis (HCA) to analyze the hair's spectral data. Our results reveal the notable difference in hair spectral analysis between the healthy people and the cancer patients, indicating that the technique of Raman microspectroscopy and imaging combined with the proper data treatment approach have a promising potential for the clinical application in disease diagnosis and prediction.

Keywords: spectroscopy biospectroscopy principal component analysis Raman  
microspectroscopy and imaging

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