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方法与技术创新

基于分子印迹敏感膜和白光反射干涉的残留药物检测技术

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摘要:

由于印迹聚合物薄膜表面具有孔洞结构而表面不平整，因此为测量其光学厚度建立了薄膜反射干涉谱（RIfS）的阶梯模型，编写了采用阻尼最小二乘法的全光谱拟合计算程序，通过对实验光谱数据的拟合处理后可以直接得到单层膜或双层膜的光学厚度。将印迹纳米微球与聚苯乙烯（PS）甲苯溶液混合，旋涂到载玻片及硅片上制备氯霉素（CAP）印迹膜作为RIfS检测系统的敏感介质层,建立了不同基底的印迹膜光学厚度变化与CAP样品浓度之间的标准曲线，检出限分别为0.229 1 mmol/L、0.185 2 mmol/L。在此基础上，对加标实际样品(牛奶)中CAP进行固相萃取，萃取液稀释后结合标准曲线进行定量，回收率为91%，所得结果与高效液相色谱（HPLC）测定结果相符，显示了印迹敏感膜结合RIfS光谱在传感器中应用的可行性。

关键词: 光学厚度;分子印迹纳米微球;敏感膜;旋涂法;白光干涉

Drug Residue Detecting Technology Based on Combing |Molecular Imprinted Polymer Film with Reflectometric Interference Spectroscopy

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Abstract:

To measure optical thickness of a molecularly imprinted polymer film whose surface was not smooth with porous structure, a ladder model for RIfS (reflectometric interference spectroscopy) was established, and a computer program for full-spectrum fitting of RIfS spectra was written based on damped least square method. Then the optical thickness of a monolayer or bilayer film could be obtained by fitting the experimental spectrum data. Sensitive films were fabricated by spin coating the mixture of CAP (chloramphenicol) imprinted nanospheres and polystyrene (PS) onto glasses and silicon wafers, respectively. Linear relationships between variance of film optical thickness and concentrations of CAP in solution were founded. The detection limits were 0.229 1 mmol/L and 0.185 2 mmol/L, respectively. Then a real sample (1 g milk fortified with 0.2 mL 0.5 mol/M CAP) was analyzed by this method. After diluting the extracted liquid and combing the standard curve, the CAP recovery was 91%, which agreed with that determined by HPLC. This result indicated that the combination of molecularly imprinted polymer films and RIfS was feasible in analyzing drugs residue.

Keywords: optical thickness molecular imprinted nanosphere Sensitive film Spincoating Reflectometry Interference Spectroscopy

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