

研究论文

硫化镉纳米微粒作探针共振瑞利散射测定某些蒽环类抗癌药物

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摘要 在pH=5.0—9.0的水溶液中, 硫化镉纳米微粒 $[(\text{CdS})_n]$ 与蒽环类抗生素米托蒽醌(MXT)、表柔比星(EPI)和柔红霉素(DNR)凭借静电引力及疏水作用力结合, 形成粒径更大的聚集体, 导致共振瑞利散射(RRS)的增强并产生新的RRS光谱, 最大的RRS峰位于292 nm(MXT体系)、285 nm(DNR体系)和315 nm(EPI体系). 与此同时还观察到二级散射(SOS)和倍频散射(FDS)强度明显提高. 其最大SOS峰位于540 nm(MXT体系)和560 nm(EPI及DNR体系), 而最大的FDS峰分别位于335 nm(MXT体系)、320 nm(EPI体系)和330 nm(DNR体系). 在一定条件下, 3种散射强度(ΔI)均与药物的浓度成正比, 反应具有高灵敏度, 对于3种药物的检出限在3.6—9.1 ng/mL之间. 其中 $(\text{CdS})_n$ -MXT体系灵敏度最高, 对MXT的检出限分别为4.1 ng/mL(RRS)、3.8 ng/mL(SOS)和3.6 ng/mL(FDS). 据此发展了一种用纳米硫化镉作探针, 灵敏、简便并快速测定蒽环类抗癌药物的共振瑞利散射新方法.

关键词 [硫化镉纳米微粒](#) [共振瑞利散射](#) [蒽环类抗癌药物](#)

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Resonance Rayleigh Scattering Spectra Method for the Determination of Anthracycline Anticancer Drugs with CdS Nanoparticles as Probe

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Abstract In water solution with pH=5.0—9.0, the CdS nanoparticles $[(\text{CdS})_n]$ can react with a kind of anthracycline anticancer drugs such as MXT, DNR and EPI to form the larger aggregates by virtue of electrostatic attraction and hydrophobic force. The aggregates arouse Resonance Rayleigh scattering(RRS) instancing greatly, and the new RRS spectra appeared. The maximum RRS peaks are at 292 nm for MXT system, 285 nm for DNR system and 315 nm for EPI system, respectively. At the same time, the Second-order Scattering(SOS) and Frequency-double Scattering(FDS) are also enhanced obviously. The maximum SOS peaks are at 540 nm for MXT system, 560 nm for EPI system and DNR system, but their maximum FDS peak are at 320 nm for EPI system, 330 nm for DNR system and 330 nm for MXT system, separately. The enhancements of three scattering(ΔI) are directly proportional to the concentration of anthracycline drugs in a certain ranges. The reactions have high sensitivities, the detection limits for different drugs are 3.6—9.1 ng/mL. Among them, $(\text{CdS})_n$ -MXT system is the most sensitive, its limits for MXT are 4.1 ng/mL for RRS method, 3.8 ng/mL for SOS method and 3.6 ng/mL for FDS method, respectively. So a new method for the determination of the anthracycline anticancer drugs with CdS nanoparticles as probe is developed, the method is highly sensitive, and it is very simple and fast.

Key words [CdS nanoparticles](#) [Resonance Rayleigh scattering](#) [Anthracycline anticancer drugs](#)

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