离子溅射仪油雾污染对溅射基底的影响

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摘 要:利用光学显微镜、场发射扫描电子显微镜、原子力显微镜以及能谱仪研究了油雾污染对溅射基底(硅片、称量纸、铜箔和载玻片)微观形貌和元素含量的影响。结果表明:溅射沉积不同时间后,硅片基底上均出现球状颗粒,且颗粒随着溅射时间延长而聚集或长大;溅射前硅片的碳含量为 4.55%,经溅射沉积 50s 后其表面碳含量约为 31.55%;铜箔和称量纸溅射沉积 50s 后的光学形貌与溅射前差异不大,未出现球状颗粒;载玻片溅射沉积 50s 的光学形貌与硅片的接近,表面随机分布着球状颗粒。硅基类基底对油雾污染极其敏感,表现为经过溅射处理后样品表面分布着球状颗粒,且碳元素质量分数约为溅射前的 7~8 倍。

关 键 词:离子溅射仪;油雾分子;基底;球状颗粒

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Influence of Oil Mist Pollution on Sputtering Substrate of Ion Sputtering Instrument

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Abstract: The effect of oil mist pollution on micromorphology and element content of sputtered substrate(silicon wafer, weighing paper, copper foil and glass slide) was studied through optical microscope, field emission scanning electron microscope, energy spectrometer and atomic force microscope. The results show that after sputtering deposition for different times, spherical particles appear on the silicon substrate, and the particles gather or grow with the increase of sputtering time. The carbon content of silicon wafer before sputtering is 4.55%, and it rises to about 31.55% after 50s of sputtering deposition. The optical morphology of copper foil and weighing paper after sputtering deposition for 50s has little difference from the sample before sputtering, and there is no spherical particle. The optical morphology of glass slide after sputtering deposition for 50s is similar to that of the silicon slide, spherical particles are randomly distributed on the surface. The silicon substrate is extremely sensitive to oil mist pollution, which is characterized by spherical particles distributed on the surface of the sample after sputtering treatment, and the mass fraction of carbon is about 7-8 times of that before sputtering.

Key words: ion sputter instrument; oil mist molecule; substrate; spherical particles

离子溅射仪是场发射扫描电镜的重要配件之一,当导电性差的样品,如陶瓷、纸片、混凝土、硅或者二氧化硅等需要通过场发射扫描电镜进行表面形貌观察和研究时,通常先对样品进行离子溅射处理[1-2]。导电性差的样品在进行图像观测时,表面或棱角位置极易形成电荷累积,进而发生表面放电或电子束漂移等现象,导致样品表面形貌无法被清楚观察到,甚至发生灼烧[3-5]。离子溅射法的原理是在低压下, 以待镀样品为阳极,金属靶材为阴极,两电极间形成辉光放电,使腔体内的残余气体电离成正离子和电子。正离子在电场的作用下,撞向金属靶材,使金属粒子得以

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