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激光烧蚀硅酸盐的材料产生氧化硅氧化铝复合团簇

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摘要 采用习飞行时间质谱技术,用308nm准分子激光烧蚀不同硅铝比的ZSM-5沸石,
产生了氧化硅氧化铝复合团簇.在负离子通道测得含铝的新团簇系列[(SiO~2)~n~-~1(ALO~2)]^-和[(SiO~2)~nOAl]^-,讨论了这些系列的丰度分布和样品硅铝比之间的关系.由于AlO~2有较高电负性,
激光烧蚀产生的团簇负离子系列[(SiO~2)~n~-~1(AlO~2)]^-具有以AlO~2为生长核心的生长机理。

关键词 激光烧蚀 沸石 飞行时间质谱法 ZSM-5 氧化硅 氧化铝 原子簇 硅酸盐 反应机理

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Generation of sillicon oxide and aluminum oxide compound clusters by laser ablation of silliceous materials

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Abstract The generation of silicon dioxide-aluminum oxide compound clusters under 308nm XeCl excimer laser ablation of ZSM-5 zeolites with different silicon aluminum mole ratios has been investigated with the time-of -flight mass spectrometry. Two strong AL-containing cluster sequences [(SiO~2)~n~-~1(AlO~2)]^-and [(SiO~2)~nOAl]^- are observed in the negative ion channel. The relationship between the abundance distribution of the cluster sequences and the silicon aluminum ratio of the siliceous material samples and the gtowth mechanism of the[(SiO~2)~n~-~1(AlO~2)]^- sequence are discussed. The presence of Al atoms in the cluster skeleton makes the [(SiO~2)~n~-~1(AlO~2)]^- sequence more stable than the [(SiO~2)~nO]^- sequence so that the intensity distribution of the two strongest sequences becomes different from that in the all-sillicon siliceous samples. Due to the high electron affinity of AlO~2 compared to (SiO~2)~n, it is considered as the core of growth of the compound cluster [(SiO~2)~n~- ~1(AlO~2)]^-.

Key words ZEOLITE TIME-OFF FLIGHT MASS SPECTROMETRY SILICON OXIDE ALUMINIUM OXIDE SILICATE REACTION MECHANISM

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