

论文

基于PDMS的倒脊形波导电光调制器的设计与制备

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摘要:

选用价格低廉、介电性能良好、低传输损耗的聚二甲基硅氧烷作为波导的包层材料,旁链型分散红1键合聚甲基丙烯酸甲酯作为芯层,设计并制备了一种倒脊形聚合物波导马赫-曾德尔电光调制器及共面波导行波电极,获得了调制器的调制信号响应.针对SF₆气体刻蚀聚二甲基硅氧烷的再淀积现象,提出了采用SF₆和O₂的混合气体对聚二甲基硅氧烷进行反应离子刻蚀的方法,发现当SF₆:O₂流量比为50 sccm:10 sccm时,刻蚀形成的凹槽侧壁陡直,底部平坦|实验制备的倒脊形马赫-曾德尔波导在1 550 nm波长下通光良好.

关键词: 聚二甲基硅氧烷 旁链型分散红1键合聚甲基丙烯酸甲酯 反应离子刻蚀 聚合物电光调制器

Design and Fabrication of Inverted Ridge Waveguide Electro-Optic Modulator Based on PDMS Material

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Abstract:

Polydimethylsiloxane is a kind of silicone which has merits of cost effective,good dielectric properties,and lower optical transmission loss in infrared range.Since the Poly[(methyl methacrylate)-co-(Disperse Red 1 methacrylate)] is applied as the active layer,in order to avoid the passive influence between the core and claddings,polydimethylsiloxane was chosen to be the cladding layer.An inverted ridge polymer waveguide Mach-Zehnder Electro-Optic modulator was designed and fabricated.Aiming at the deposition phenomena which arises when only using SF₆ in polydimethylsiloxane reactive ion etching,a method of utilizing the mixture of SF₆ and O₂ was proposed for polydimethylsiloxane reactive ion etching process.It was found that when the flux ratio of SF₆:O₂ is 50 sccm:10 sccm,the groove has the best shape.Through the optical test,the fabricated inverted ridge Mach-Zehnder waveguide has a good near-infrared light output.Co-planar waveguide electrodes based on Aluminum material were designed and fabricated,and signal response of electro-optic modulator was observed.

Keywords: Polydimethylsiloxane Poly[(methyl methacrylate)-co-(Disperse Red 1 methacrylate)] Reactive ion etching Polymer electro-optic modulator

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