

Study on ultra-precision polishing of optical crystals

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Potassium dihydrogen phosphate (KDP) crystals have attracted much attention in the field of high-power laser systems due to their excellent nonlinear optical properties, high laser damage threshold, and outstanding transparency and birefringence across the near-infrared to ultraviolet wavelength range. However, KDP crystals are soft, brittle, and easily soluble in water, making it difficult to obtain high-quality surfaces. In this study, a polishing solution composed of ethanol and water was utilized. Through a two-step abrasive-free water dissolution polishing technique, a high-quality KDP crystal surface with a surface roughness (S_a) of 2.18 nm was obtained. The effectiveness of the cleaning method was experimentally verified, and the influence of ethanol content in the polishing solution on surface roughness and material removal rate was also investigated. This work provides theoretical basis and technical support for the ultra precision machining of KDP crystals.
