

The V-Shape Montel optics with 50 nanometer resolution

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Montel optics is actually two identical sets of KB mirror to increase the numerical aperture. The V-shape Montel optics are two identical ellipsoidal surfaces side by side and been placed as V-shape, the normal direction of the surface is 45 degree to the gap, which generates the identical profiles of the two edges which minimized the gap loss. With the state-of-the-art polishing technique- elastic emission machining (EEM), the Montel optics with the slope error less than $0.05 \mu\text{rad}$ is obtained. The holder of the Montel optics is also critical, with ten piezo axes and less than $0.1 \mu\text{rad}$ angle stability was achieved.

This V-shape Montel optics is first test in nanoprobe endstation at Taiwan Photon Source (TPS) 23A. This beamline is only 70 meters long and the working distance is 55 mm. Therefore, we balance the effect form geometrical and diffraction. The designed focus spot is around 40nm. Until now, we have the test result that the spoke pattern of 50 nm is resolved.

In this talk, the design of Montel optics, beamline, and the endstation will be introduced, and the commission result of Montel optics will be reported.