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Micro-Roughness Measurement of Optical Surfaces with a Height Resolution in the Picometer Range

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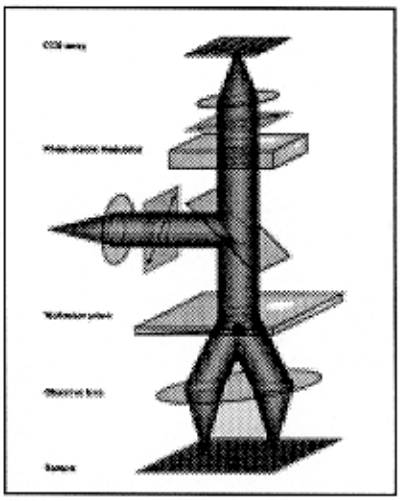
The resolution of currently commercially available roughness measuring optical interferometers such as, for example, WYKO TOPO 2D is limited to 1 Angstrom rms. With the advances in polishing techniques combined with a more stringent requirements on SR optical surfaces, there is a need for an instrument with higher resolution and sensitivity. In this presentation, we propose to use a polarization based interferometer that allows roughness measurements with a height resolution in the picometer range [1,2]. This instrument is to be developed by SESO Corp. (France) in a collaboration with CNRS (France) and the APS/Argonne. The instrument basic principle is described, and its performance are compared with that of WYKO TOPO-2D/3D.



	WYKO TOPO	Proposed System
Measurement Technique	Optical Phase Shifting	Polarization Modulation
Measurement Capability	2D & 3D	2D
Height Resolution	1 A (for 2D) 3 A (for 3D)	<10 pm
Use of a Reference Mirror	Yes	No
Use of a Calibration Optic	Yes	No
Environment Sensitivity	High	Low

[1] P. Gleyzes, F.Guernet et A.C. Boccara, J. Optics (Paris), 1995, vol. 26, N 6, pp 251-265
[2] P. Gleyzes et al., Optics Letters, October 15, 1997, Vol. 22. No 20, pp 1529-1531