Chapter 3

Objectives

1. **Development of a combination technique of interferometric phase shifting and off-axis illumination** that minimizes the optical aberrations caused by the thick beam-splitter placed between the projection lens and the wafer, as well as by two-beam imaging.

2. **Experimental demonstration of resolution enhancement by means of an annular aperture using an on-axis contact hole.**

3. **Coated objective optimization based on wave optics model** from the aspect of resolution, DOF, light loss and side-lobe intensity, using a single point-like source. **Simulation of extended contact hole arrays** using an optimized filter with Solid-C.

4. **Theoretical description of the aerial image of an on-axis hole when a birefringent plane-parallel plate is placed between the lens and the resist.**

5. **Development of a new coherent multiple imaging technique** based on application of a Fabry-Perot etalon inserted between the mask and the projection lens.

6. **Development of an effective and fast simulation method** of the proposed CMI technique, which does not require any software modifications.

7. **Comparative simulation and experimental evaluation of the point-spread function of the optical system.**

8. **Spatial coherence optimization for contact hole arrays** when the Fabry-Perot based CMI technique is used.

9. **Comparative simulation and experimental evaluation** of the aerial images **of extended mask patterns** (off-set contact hole arrays and line/space patterns).