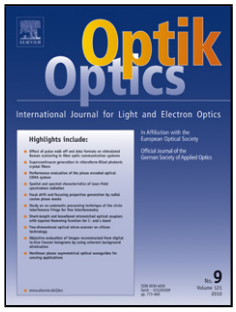

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The Fabrication of Hydrophilic Structure on Lens via Direct Laser Interference Lithography

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Abstract: The temperature difference between indoor and outdoor could cause the formation of droplet on lens. A kind of new fog-proof technology is presented in this paper. Hydrophilic structures are patterned on the surface of lens by means of direct laser interference lithography. The contact angle (CA) and the morphology of the structure are observed under CA meter and optical microscope respectively. The results show that with the power of 49.1W, the incident angle of 9°, and the exposure times of 2, the structure with period of 30.7**μm** could be produced on the surface. What's more, the CA meter shows that the produced structure could change the CA from 78°which is intrinsic to 58°.

Keywords: Laser Interference lithography; fog-proof technology; lens; hydrophilic structure

1. Introduction

As a common optical component element, lens has been widely applied in various fields. Such as myopia, windscreen, rearview mirror, medical endoscope, photographic lens, etc. The vapor in the air is condensed into droplets when the ambient temperature of the lens decreases abruptly, and then attaches to the surface of the lens, causing diffuse reflection when light illuminates the lens, which would lead to bad results like traffic accident, medical accident, etc. Therefore, fog-proof technology of lens has received considerable attention. High-performance fog-proof technology can not only facilitate people's lives, but also bring obvious economic benefits [1].The traditional fog-proof technology is consist of two categories: the hydrophilic and the hydrophobic respectively[2]. The ultimate principle of hydrophobic fog-proof technology is to coat a layer of hydrophobic film on the surface of substrate, so that the droplet is easy to slide, thereby affecting the formation of droplet on lens to achieve the purpose of fog-proof. The film can be divided into physical adhesion film and chemical adhesion film according to the difference of adsorption force between the film and substrate [3]. Typically, the physical adhesion film mainly relies on the Van der Waals' force to adsorb hydrophobic substances on the surface of the substrate to get fog-proof purpose. Although this method is effective, the durability of the film is not long [4]. In other words, the lens cannot maintain long-term hydrophobicity because the film will be dissolved in the droplets formed on the surface. Shan Jinhuan[5] et al prepare a polymer antifogging agent by mixing 0.8% OP emulsifier, 15% ethanol, 5% isopropyl alcohol, 2%anionic surfactant water solution and distilled water. The experimental results show that the effective time is about 12 days which is too short to have practical value although the formula is harmless to the human body. Chemical adhesion film