

User

what is engineered optics? how are engineered optics applied to making AR/VR/XR/MR headsets and lenses?

Bing

Engineered Optics is an entirely new field of optics that has emerged. For centuries, optical design has been grounded in the fundamentals that the curvature of the lens determines the optical path. Curved lenses are used in most cameras and image sensors to manipulate light. However, Engineered Optics is changing the paradigm of optical design by fabricating optical elements with micron and sub-micron sized features. These microscopic features can replace curved lenses, prisms, mirrors, and other bulkier components that are traditionally used in optics.

Engineered Optics is being applied to make AR/VR/XR/MR headsets and lenses. For example, Radiant Vision Systems has developed an AR/VR Lens with a unique optical design specially engineered for measuring near-eye displays (NEDs), such as those integrated into virtual (VR), mixed (MR), and augmented reality (AR) headsets. The lens design simulates the size, position, and field of view of the human eye. This technology is helping to improve the accuracy and efficiency of measurement for headset displays.

Bing

engineered optics

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User

what is chromium thin film used for to make those lenses? i know it can be used to make masks for lithography

Bing

Chromium thin films are used in the fabrication of photomasks for lithography. Photomasks are typically transparent fused silica plates covered with a pattern defined with a chromium (Cr) or Fe₂O₃ metal absorbing film. In lithography, photomasks are used to transfer patterns onto a substrate, such as a silicon wafer, using light. The chromium film on the photomask absorbs light, preventing it from passing through the mask and exposing the photoresist on the substrate. This allows for precise control over the pattern that is transferred onto the substrate.

However, I couldn't find any specific information about the use of chromium thin films in making AR/VR/XR/MR headsets and lenses. It's possible that chromium thin films are used in some way during the manufacturing process of these devices, but I couldn't find any direct evidence of this. Is there anything else you would like to know? 😊

User

how is thin film Niobium Oxide used in making lenses?

Bing

Niobium oxide (Nb₂O₅) is a transition metal oxide that has a broad variety of properties that make it a potentially useful and highly applicable material in many different areas. Thin films of niobium tungsten oxide have been investigated for their potential use in optical modulation. These films have been found to have excellent electrochromic properties, such as high color contrast, quick switching time, excellent modulation of percentage transmittance, long cyclic durability, and stability. These properties make niobium tungsten oxide thin films a promising candidate for use in electrochromic devices, such as smart windows and displays.

However, I couldn't find any specific information about the use of niobium oxide thin films in making lenses for AR/VR/XR/MR headsets. It's possible that niobium oxide thin films are used in some way during the manufacturing process of these devices, but I couldn't find any direct evidence of this. Is there anything else you would like to know? 😊

User

what about Titanium oxide? how is thin film TiOx used in making lenses?

Bing

Titanium dioxide (TiO₂) has been used in optical coatings for the visible region for many years. TiO₂ has two particularly desirable qualities. It provides the highest index film material for the visible region, and it is hard and stable in combination with other oxides. Coating examples using TiO₂ as the high-index material include beam splitters, cold mirrors and heat-reflecting mirrors, and AR on glass and polymer substrates. When paired with SiO₂ films, multilayer combinations totaling in excess of 50 layers have been deposited that show excellent durability and low mechanical stress because the tensile stress of titania layers is balanced by the compressive stress of the silica layers.

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User

what about aluminum? how is thin film Al used in making lenses? does it involve creating a mirror?

Bing

Aluminum is commonly used in optical coatings, including those used in making lenses. The simplest optical coatings are thin layers of metals, such as aluminum, which are deposited on glass substrates to make mirror surfaces, a process known as silvering. Aluminum is the cheapest and most common coating, and yields a reflectivity of around 88%-92% over the visible spectrum. By controlling the thickness and density of metal coatings, it is possible to decrease the reflectivity and increase the transmission of the surface, resulting in a half-silvered mirror. These are sometimes used as "one-way mirrors".

However, I couldn't find any specific information about the use of aluminum thin films in making AR/VR/XR/MR headsets and lenses. It's possible that aluminum thin films are used in some way during the manufacturing process of these devices, but I couldn't find any direct evidence of this. Is there anything else you would like to know? 😊

User

what about Silicon Oxide? how is thin film SiOx used in making lenses?

Bing

Silicon dioxide (SiO₂) is a material that has found many applications in the field of optoelectronics, semiconductors, telecommunications, and energy saving. In the glass industry, SiO₂ thin films have found their application as a low index and protective layer in multilayer low emissivity coatings. The low refractive indices, low absorption, and low scatter losses of amorphous silicon dioxide thin films make them suitable candidates for interference-active layers in optical systems. Additionally, they can be used to increase the optical transmittance and minimize energy losses of solar collectors.

However, I couldn't find any specific information about the use of silicon oxide thin films in making AR/VR/XR/MR headsets and lenses. It's possible that silicon oxide thin films are used in some way during the manufacturing process of these devices, but I couldn't find any direct evidence of this. Is there anything else you would like to know? 😊

User

what about silver? how is thin film Ag used in making lenses? does it involve creating a mirror?

Bing

Yes, silver is one of the metals that can be used in optical coatings, including those used in making lenses. The simplest optical coatings are thin layers of metals, such as silver, which are deposited on glass substrates to make mirror surfaces, a process known as silvering. Silver has a reflectivity of 95%-99% even into the far infrared, but suffers from decreasing reflectivity (<90%) in the blue and ultraviolet spectral regions. By controlling the thickness and density of metal coatings, it is possible to decrease the reflectivity and increase the transmission of the surface, resulting in a half-silvered mirror. These are sometimes used as "one-way mirrors".

Is there anything else you would like to know? 😊

User

what about aluminum oxide? how is thin film aluminum oxide used in making lenses? What is the difference between aluminum oxide's purpose and aluminum's purpose?

Bing

Aluminum oxide (Al₂O₃) is a technologically promising material in optics, machinery, batteries, and microelectronics applications because of its advantages like high dielectric constant, excellent stability, favorable thermal conductivity, high hardness, and low refractive index. Al₂O₃ film can be fabricated by several methods, including atomic layer deposition (ALD), which is one of the most effective methods used in Al₂O₃ film fabrication, especially the application in optical lenses.

On the other hand, aluminum is commonly used in optical coatings to make mirror surfaces, a process known as silvering. The metal used determines the reflection characteristics of the mirror; aluminum is the cheapest and most common coating and yields a reflectivity of around 88%-92% over the visible spectrum. By controlling the thickness and density of metal coatings, it is possible to decrease the reflectivity and increase the transmission of the surface, resulting in a half-silvered mirror.

In summary, aluminum oxide is used as a low refractive index material in optical coatings for lenses while aluminum is used as a reflective coating for mirrors. Is there anything else you would like to know? 😊