ULTRA-BROADBAND, HIGH EFFICIENCY, AND POLARIZATION INDEPENDENT ACHROMATIC METALENS

Tech ID: 31690 / UC Case 2020-056-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230014285	01/19/2023	2020-056

BRIEF DESCRIPTION

Traditional optical systems rely on bulky combinations of multiple lenses to correct for chromatic aberration—a phenomenon where different colors of light focus at different points due to material dispersion. UC Berkeley researchers have developed an ultra-broadband, high-efficiency achromatic metalens that overcomes these limitations using a flat, nanostructured surface. This metalens is a subwavelength device that precisely controls the phase, polarization, and wavefront of light. Unlike previous flat-lens designs that were restricted to narrow bandwidths or suffered from low efficiency, this technology provides consistent focusing across a wide spectrum of light and functions independently of the light's polarization state. This advancement enables the creation of high-performance, miniaturized imaging systems that are significantly thinner, lighter, and more cost-effective than conventional refractive optics.

SUGGESTED USES

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Smartphone Camera Modules: Replacing thick, multi-element lens stacks with ultra-thin metalenses to enable slimmer mobile devices without sacrificing image quality.

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Virtual and Augmented Reality: Designing lightweight and compact headsets with superior color correction for more immersive visual experiences.

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Miniaturized Medical Endoscopes: Creating high-resolution imaging probes for minimally invasive surgery and internal diagnostics.

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Unmanned Aerial Vehicles: Reducing the payload weight of drones by utilizing compact, broadband imaging systems for surveillance and navigation.

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Advanced Microscopy: Implementing flat, high-efficiency lenses in scientific imaging equipment to achieve high-fidelity color reproduction at the micro-scale.

ADVANTAGES

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INVENTORS

» Kanté, Boubacar

OTHER INFORMATION

CATEGORIZED AS

» **Optics and Photonics**

» All Optics and Photonics

» **Engineering**

» Engineering

» **Materials & Chemicals**

» Nanomaterials

RELATED CASES

2020-056-0

Superior Color Correction: Eliminates chromatic aberration across a continuous, ultra-broad bandwidth, ensuring sharp images across all colors.

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High Optical Efficiency: Delivers significantly better light throughput compared to earlier metalens technologies, resulting in brighter images and lower power requirements.

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Polarization Independence: Works effectively with any state of light polarization, making it versatile for various lighting environments.

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Extreme Miniaturization: The flat metasurface design allows for the integration of complex optical functions into a footprint only a few micrometers thick.

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Mass-Producible: Leverages standard semiconductor fabrication processes, allowing for high-volume manufacturing and reduced production costs.

RELATED MATERIALS

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