

Novel applications of meta-devices

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The novel optical meta-devices, such as the achromatic meta-lenses for imaging and light-field sensing, meta-devices used in water or drone in the air, quantum optics, bio-medical application, and metaverse are addressed in this talk.

The novel properties of metamaterial devices are mainly from their designed nanostructures. The size, geometry, shape, orientation, and specific arrangement can provide new and useful functions beyond conventional materials' capability. The fabrication process of meta-device could be compatible with the semiconductor microelectronics mass production. The advantages of meta-devices are lightweight and small size with the possibility of high efficiency, better performance, broad bandwidth, and lower energy consumption in the system level. For example, meta-lens was listed as one of the top 10 emerging technologies in the World Economic Forum. The intrinsic advantage is spherical aberration-free. The basic principle, design, fabrication, and applications of the novel optical meta-devices are addressed in this talk. The achromatic meta-lenses for optical imaging and light-field sensing will be shown. Meta-lenses used in water or drone in the air, quantum optics, and bio-medical applications are demonstrated. The prospects of the demanded meta-devices for the metaverse will be discussed. The meta-devices open up an avenue for future novel applications in micro-robotic vision, unmanned-vehicle sensing, virtual and augmented reality, miniature personal security systems, biomedical, healthcare, and quantum information technologies, etc.

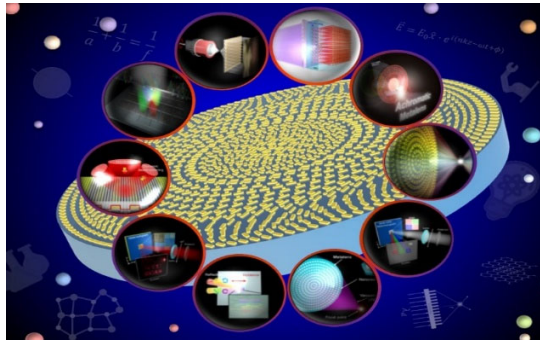


Fig. 1 Novel applications of meta-devices.

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