**How to Make a Matte Surface Broadband Transparent?**

Mu Wang

National Laboratory of Solid State Microstructures, School of Physics, and Collaborative Innovation

Center of Advanced Microstructures, Nanjing University, Nanjing 210093, China

The long-standing paradox between matte appearance and transparency has deprived traditional matte materials of optical transparency. Here, we present a solution to this centuries-old optical conundrum by harnessing the potential of disordered optical metasurfaces. By constructing a random array of meta-atoms tailored in asymmetric backgrounds, we have created transparent matte surfaces that maintain clear transparency regardless of the strength of disordered light scattering or their matte appearances. This remarkable property originates in achieving highly asymmetric light diffusion, exhibiting substantial diffusion in reflection and negligible diffusion in transmission across the visible spectrum. By fabricating macroscopic samples of such metasurfaces through industrial lithography, we have experimentally demonstrated transparent windows camouflaged as traditional matte materials and transparent displays with high clarity, full color, and one-way visibility. This discovery introduces an unprecedented frontier of transparent matte materials in optics, offering unprecedented opportunities and applications.