Title:	Optical functionality of natural photonic structures on the transparent insect wings for bio-mimetic applications
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Abstract:	We experimentally and numerically probe the natural quasi-ordered complex structures in the transparent insect wings by a simple, non-invasive, real time optical diffraction technique using monochromatic cw lasers and broadband femtosecond laser pulses. A complex diffraction pattern in transmission unveils the signature of long range spatial correlation in structural arrangement (symmetry) at various length scales on the whole wing surface for a variety of insect wings. A quantitative analysis analysis of the Fast Fourier transform (FFT) angular spectrum reveals a direct link between the structural organization and optical transmitted diffraction patterns. Our findings directly demonstrate how the diffraction pattern through the transparent insect wings is spatially and functionally correlated with its structural origination at various length scales. The methodology of the studies developed in this paper is applicable to a wide class of disordered photonic structures.
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