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Bioinspired coating for bird-safe glazing optimised for avian and human vision

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Abstract: Bird-window collisions often lead to the death of the bird and damage to the window. However, many animals, including birds, can perceive UV light. Many species have hence developed visual communication in this wavelength range, for instance, thanks to photonic structures. Such structures allowed us to design a new UV-reflecting multilayered coating for bird-safe glazing, through a bioinspiration approach. This coating was optimised for bird and human visual perception.

Every year, billions of birds collide with windows, often resulting in their death, as well as in significant material damage. Some manufacturers developed UV-reflective coatings for bird-safe glazing. These coatings are often visible to the human eye over a wide range of viewing angles. In addition, the bird perception of these glazings is usually not considered in depth when developing such selectively reflective devices. However, many animal species, including birds and insects, have developed a wide variety of photonic structures active in the UV due to their perception of light in this range of the electromagnetic spectrum [1]. These structures, optimised during evolution by natural selection, allow us to elaborate new concepts of optimised coatings for selective reflection in the UV and to develop bird-safe glazing through a bioinspiration approach [1]. We developed a bird-safe coating for flat glass panels and polymers that exploits the difference of light perception between humans and birds. This coating consists of a periodic multilayer of metal oxide layers deposited on soda-lime glass substrates by Physical Vapour Deposition (PVD) with patterns. The optical response of the multilayer was numerically designed in terms of morphology and material composition, through a multi-objective optimisation, using human and avian colour perception models. Such a coating deposited on a window makes the window bird-safe, while preserving the aesthetics of the window. The deposited pattern is invisible to human eyes but strongly reflects in the UV range.

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