

## Tunable and flexible mirror/filter for coating

CSIC has developed a new coating that functions as a color selective mirror/filter, serving to shield certain radiation in the ultraviolet range, visible or near infrared. It is a flexible material that adapts to different types of substrates and form, providing the choice of color and protection.

The innovative solution found is based on the nanostructured coating formed by nanometer thick layers of different oxides. In that sense, the mechanism of light selection does not involve light absorption and thus avoid unwanted overheating of the coating.

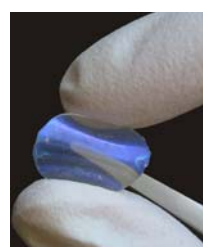
### An offer for Patent Licensing

#### An innovative light-selecting protector

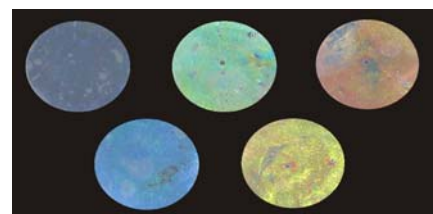
The new product offered is a Bragg mirror flexible and adaptable to any kind of surface which has a high reflectivity to electromagnetic radiation of a specific wavelength, thus allowing the choice of the coating colour and the radiation reflected from the object coated. Also, the optical properties of the mirror make it suitable to act as an optical interference filter.

The mirror consists of a porous multilayered photonic crystals, in which is embedded a polymer that gives it flexibility and mechanical strength, allowing the separation from the substrate on which is fabricated and then attach it to any arbitrary surface.

The flexible Bragg mirror presents wide ( $\Delta\lambda / \lambda \approx 40\%$ ) and high intensity ( $I_{MAX} \approx 70\%$ ) reflection peaks. Moreover, their spectral position can be precisely adjusted by changing the parameters of the internal structure of the multilayer photonic crystal. It's also possible to pile up different photonic crystals to attain optical coatings that efficiently block wide spectral ranges.



The novel filter can be easily implemented in the current processing lines to manufacture coating in all colours and shapes



#### Main applications and advantages

- Material consisting of nanometer thick layers with a flexible, mechanically stable structure. These features make it unique to function as a mirror / filter of the chosen radiation, adaptable to any surface, including dynamic ones such as skin.
- There is no transformation of the radiation into heat. This prevents the unwanted overheating that occurs in most commercialised coloured flexible coatings.
- The new manufacturing process provides full control over the type of radiation reflected. That provides the new product some advantages in using it as a protector, among which is worth noting:
  - It doesn't exist a sunscreen that protects the skin from all types of UV radiation abruptly, as is achieved with the product offered.
  - The use of the product as optical protector in goggles or window glass prevents unwanted colorations without losing protective qualities.
- The new manufacturing process works with a wide spectrum of polymers, allowing the addition of new features provided by the polymers used, and minimizes the required material quantities.

#### Patent Status

PCT ("International") patent application filed. Priority established by a Spanish patent application.

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