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## Producing, characterizing and modeling nanostructured surfaces with complex visual appearance

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Gonio-apparent surfaces are characterized by huge variations of their visual rendering depending on illumination and observation directions. Such surfaces are more and more employed in industry for aesthetic reasons. Hotel Marqués de Riscal d'Elciego in Spain, for example, is covered by anodized titanium plates, which give the building a color change with sun position. The optical and colorimetric characterization of these materials is tricky as their optical properties vary highly with the illumination and/or observation geometries. Georges Friedel Laboratory has developed a high resolution optical device dedicated to the measurement of the bidirectional reflectance distribution function (BRDF) of such materials. This optical device has allowed the characterization of the color variations of gonioapparent materials such as anodized titanium and nanostructured anodized aluminum. Chromatic paths of the colors of the material as a function of illumination and observation direction have been deduced from the BRDF measurements. Electromagnetic models of the optical properties of these materials have been developed, showing good accordance with BRDF measurements. It has been for example demonstrated that it is possible to adapt the Fourier modal method, which is generally dedicated to the modelling of periodic nanostructures, to the partially ordered structure exhibited by nanostructured anodized aluminum.

### Biography

Renee Charriere has completed her PhD in Optics and Quantum Mechanics in 2011 from the French Aerospace Lab (Office National d'Etudes et de Recherches Aérospatiales) and Paris VI University. As a Post-doctorate, she has worked on the optical characterization and modeling of nanostructured surfaces with complex visual appearance. She is now an Assistant Professor at the French Laboratory Georges Friedel in Saint-Etienne and is currently a Guest Researcher at National Institute of Standards and Technology in USA.

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