

7th World Nano Conference

June 20-21, 2016 Cape Town, South Africa

Order-disorder on the nanostructures on the ocellus of the *Caligomemnon*(C.& R. Felder[1867]) butterfly

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The *Caligomemnon* butterfly has on its ventral under side false 'eyespot' (ocellus). On the inner ring of the ocellus are wing scales of black colour. In our quest to unravel the usefulness of this selective solar absorber-like material, the nanostructures on that section of the wing scale were investigated with various techniques. As evident from the scanning electron microscopy images (SEM), the wing scales on the black section contain ridges and lamellae, which show disorder in their shapes and positions. We have analysed and quantify the type of such order-disorder using direct measurement; statistical approach and Fourier transform methods. Based on the autocorrelation of the SEM image and the Hosemann function, an algorithm to compute the line cuts of the order-disorder was developed. The line cuts provided the average values of periodicity, which were used to calculate the porosity in the wing scale. The porosity was found to be the origin of the antireflection property of the black section bio mimicking as selective solar absorber material.

Biography

Juliet Sackey, 31 years old is pursuing PhD studies in Physics with the University South Africa. She is the recipient of the award from the Organization for Women in Science for the Developing World, (OWSD), and the African Development Bank award to read theoretical Physics with the African University of Science and Technology (AUST). Her current research is focused on studying the morphological structures and the optical interpretations in the wings of butterflies for sustainable renewable energy and nanophotonics applications. She has presented several talks in both local and international conferences. She has also published many research articles in peer reviewed journals.

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