THÔNG TIN THAM LUẬN CỦA HỘI THẢO
"Innovations in Solar Energy and Advanced Material Engineering" -
"Những đổi mới trong năng lượng mặt trời và kỹ thuật vật liệu tiên tiến"

1. Recent Progress in Solar Photovoltaics

Diễn giả: GS. Martin A. Green
Đơn vị công tác: Đại học New South Wales (UNSW Sydney), Sydney, Australia

Tóm tắt

Over the last decade, the cost of photovoltaic solar energy conversion has dropped very dramatically with solar photovoltaics "now the cheapest source of electricity in most countries" and "now offering some of the lowest cost electricity ever seen", according to the International Energy Agency. However, improvements are in the pipeline that are leading to an era of "insanely cheap" solar power, within the coming decade. The scientific and industrial developments leading to these cost reductions will be described, as well as likely further technical progress leading to further cost reduction and installation volume growth over the coming decade. The role of photovoltaics in climate change mitigation will also be discussed.

2. Bacterial Adhesion and Biofilm Formation: What Can We Learn by Engineering Materials and Interfaces?

Diễn giả: GS. Mônica A. Cotta
Đơn vị công tác: Đại học Campinas, Viện Vật lý Gleb Wataghin, Campinas, SP, Brazil

Tóm tắt

Understanding bacterial cellular signaling and function at the nano-bio interface can pave the way towards developing next-generation smart diagnostic tools, as well as provide new targets for preventing biofilm-related infections. In the last decade, we have extensively investigated the bacterial life cycle of Xylella fastidiosa, an economically-important phytopathogen which affects cultures worldwide. The pathogenicity of X.fastidiosa is related to biofilms formed in xylem vessels, which generate hydric stress with major impacts on agricultural productivity. In this work we devise and discuss different materials platforms to further understand X.fastidiosa interaction with surfaces as well as key mechanisms involved in cellular assembly leading to biofilm formation. In particular, we will show how single-crystalline nanowire arrays can be used to probe in real time cell adhesion forces in the presence of drugs reported to control infection, such as n-acetyl-cysteine, narrowing down possible molecular mechanisms to improve efficacy of these methods as treatments for infected specimens. In different approach, we have used Au micropatterns on SiO2 substrates, to create spatially-selective adhesion of X. fastidiosa cells. Our Au disk

arrays provide close control of both cell density and distances between cell clusters. Our results elucidate the quorum sensing-based formation of filamentous cells as induced by local bacterial density; their growth is oriented toward neighboring cell clusters in a distance-dependent manner which eventually creates a network of interconnected cell clusters that facilitate the macro-scale biofilm architecture. These results indirectly confirm quorum sensing based chemical signaling involved in the formation of filamentous cells associated with bacterial clusters of X. fastidiosa. The platforms reported here are not only promising to understand complex phenomena of multicellular assembly but also offer new directions to engineering biological systems.