

Bio-inspired micro-nano fractal transparent conductors

by

Jinwei Gao

Gannan Normal University & South China Normal University

Abstract

Nature offers structural solutions to various optimization problems. For example, an optimal, low-shedding water transport at various scales is achieved with quasi-fractal structures, shown to be close to optimal. In a series of projects, metallic network analogs of some of these solutions to make high-efficiency transparent conductors are studied. Specifically, transparent conductors are developed by directly metalizing leaf venations, spider webs, and other organic fibers. Also, the natural process of self-cracking, similar to that occurring in the mud of dried-out riverbeds, is employed to develop masks for metallic network fabrications. These comprehensive studies and developments contributed to, and in some cases initiated new directions in the field of network transparent conductors. These structures offer performance exceeding those of conventional oxide-based films, while providing a possibility of reduced processing expense. Finally, a roll-to-roll pilot production line has been developed for producing the transparent conductive film on flexible plastic substrates with width of ~400 mm, also the real applications have been conducted based on perovskite solar cells, display, smart window, *etc.*

Biography



Jinwei Gao is a professor at the Center for Advanced Optoelectronics at Gannan Normal University & South China Normal University. He serves as the director of academic committee of Gannan Normal University. He earned his Ph.D. degree from South China University of Technology, supplemented by two-year Ph.D. research in the Professor Gang Chen's group at MIT. Professor Gao's research interests primarily revolve around transparent conductors, perovskite photovoltaics, X-ray detectors and their pathways to industrialization. His academic contributions include authoring over 200 archival articles, with approximately 10000 citations on Google Scholar, as well as three book chapters. He has delivered more than 60 invited talks and holds over 45 granted. Additionally, he has co-founded a company. Presently, Professor Gao serves as the Editor-in-Chief of Surfaces and Interfaces.

Date : 13 December 2024 (Friday)
Time : 3:30pm – 4:30pm
Venue : G6302, Yeung Kin Man Academic Building,
City University of Hong Kong
Language : English

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