

Advanced materials in agriculture-related applications

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In the last years, conventional farming systems have greatly improved productivity and efficiency, leading to substantial increases in food availability and affordability, ranging from 70% to 90%. However, some conventional agricultural practices, including large-scale monoculture cultivation, exploitation of highly productive hybrid crops, and extensive use of water, pesticides, and fertilizers raise various ecological, economic, and social concerns that require a transition to a more sustainable agriculture. In this presentation, cutting-edge technologies are explored to enhance farming practices, and research results on innovative systems improving crop protection and nano-sized sensors integrated with microelectronic devices are presented. Indeed, smart materials enable crop monitoring and sustainable management of resources. At the same time, nano-sized coatings for packaging confer catalytic, antimicrobial, and barrier properties, preserving food safety and preventing food waste.