

## Nanomaterial-Biomolecule Hybrids as Eco-Friendly Foliar Agrochemicals

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### Abstract

The increasing population and deteriorating environment demand both high productivity and least impact to the ecosystem from future agricultural production. The conventional agrochemicals have been applied to effectively enhance the productivity, however, are also one key source of the pollution to the environment and the damage to the ecosystem. A new era of agricultural technology is called, demanding higher efficiency, better sustainability, and reliable environmental resilience. The adoption of biomolecules has emerged as a promising solution due to their sensitivity, specificity, biocompatibility, and degradability. However, the biomolecules are vulnerable before they are taken up, hindering the commercialization of biomolecule agrochemicals. Introduction of nanotechnology will afford effective and economic solutions to actualize the new-generation agrochemicals for eco-sustainable agricultural production. Particularly, these nanocarrier-biomolecule hybrids will be ideal for topical applications. Hereby, we briefly introduce the applicable biomolecules for plant growth regulation and pathogen control, propose the criteria and strategies of R&D, and discuss several typical nanocarrier-biomolecule hybrids as the candidates with scientific merits and industrialization potential.

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