

# GENE DELIVERY INTO MATURE PLANTS USING CARBON NANOTUBES

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## INVENTORS

» Del Carpio Landry, Markita P.

## OTHER INFORMATION

### KEYWORDS

transfection, gene delivery, plants,  
CRISPR

### CATEGORIZED AS

- » **Agriculture & Animal Science**
  - » Transgenics
- » **Biotechnology**
  - » Genomics
- » **Materials & Chemicals**
  - » Nanomaterials
- » **Nanotechnology**
  - » NanoBio
- » **Research Tools**
  - » Nucleic Acids/DNA/RNA
  - » Reagents

### RELATED CASES

2017-134-0

## PATENT STATUS

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Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,661,606	05/30/2023	2017-134

## BRIEF DESCRIPTION

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Current methods of biomolecule delivery to mature plants are limited due to the presence of plant cell wall, and are additionally hampered by low transfection efficiency, high toxicity of the transfection material, and host range limitation. For this reason, transfection is often limited to protoplast cultures where the cell wall is removed, and not to the mature whole plant. Unfortunately, protoplasts are not able to regenerate into fertile plants, causing these methods to have low practical applicability.

Researchers at the University of California have developed a method for delivery of genetic materials into mature plant cells within a fully-developed mature plant leaf, that is species-independent. This method utilizes a nano-sized delivery vehicle for targeted and passive transport of biomolecules into mature plants of any plant species. The delivery method is inexpensive, easy, and robust, and can transfer biomolecules into all phenotypes of any plant species with high efficiency and low toxicity.

## SUGGESTED USES

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- » Create crops that are resistant to drought, insects, herbicides and diseases
- » Synthesize novel small-molecule drugs
- » Develop more efficient and clean biofuels, improved biofuel production

## ADVANTAGES

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- » Ability to deliver cargo into mature walled-plants additional to the protoplasts
- » Low cytotoxicity
- » Moderate to high transfection efficiency
- » Plant species-independent internalization
- » Passive penetration of lipid bilayer membranes and cell wall
- » Complete experiment time frame of a week (after having plants ready)
- » Possible conjugation of many different types of biomolecules

## RELATED MATERIALS

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- » [Nanoparticle-Guided Biomolecule Delivery for Transgene Expression and Gene Silencing in Mature Plants](#)

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Method For Imaging Neurotransmitters In Vitro and In Vivo Using Functionalized Carbon Nanotubes](#)
- ▶ [Cell Penetrating Peptides For Nucleic Acid And Protein Delivery In Plants](#)



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