

MIT scientists create plants that can glow in the dark

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Illumination from nanobionic plants might one day replace some electrical lighting, says study

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MIT scientists have found a way to induce plants to give off dim light by embedding specialised nanoparticles into their leaves, a major step towards using plants to illuminate the workspace.

This technology could also be used to provide low-intensity indoor lighting, or to transform trees into self-powered streetlights, the researchers said.

“The vision is to make a

plant that will function as a desk lamp – a lamp that you don’t have to plug in. The light is ultimately powered by the energy metabolism of the plant itself,” said Michael Strano, Professor at Massachusetts Institute of Technology (MIT).

To create the glowing plants, the team turned to luciferase, the enzyme that gives fireflies their glow.

Luciferase acts on a molecule called luciferin, causing it to emit light.

Another molecule called co-enzyme A helps the process along by removing a reaction by-product that can inhibit luciferase activity.

The team packaged each of these three components into a different type of nanoparticle carrier.

In the study published in the journal *Nano Letters*, the researchers used silica nanoparticles about 10 nanometres in diameter to carry luciferase, and they used slightly larger particles of the

polymers PLGA and chitosan to carry luciferin and coenzyme A, respectively.

To get the particles into plant leaves, the researchers first suspended the particles in a solution.

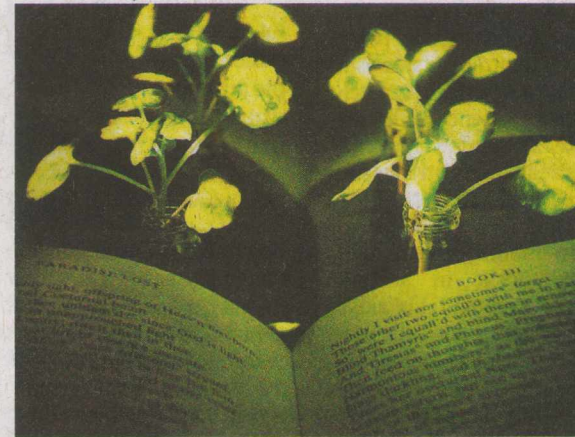
Plants were immersed in the solution and then exposed to high pressure, allowing the particles to enter the leaves through tiny pores called stomata.

Particles releasing luciferin and coenzyme A were designed to accumulate in the

extracellular space of the mesophyll, an inner layer of the leaf, while the smaller particles carrying luciferase enter the cells that make up the mesophyll.

The PLGA particles gradually release luciferin, which then enters the plant cells, where luciferase performs the chemical reaction that makes luciferin glow.

The researchers’ early efforts at the start of the project yielded plants that could glow for about 45 minutes.



Green is in: A book illuminated with the nanobionic light-emitting plants. • MIT