



From Research Excellence to Impact

Sensors for Sustainable Agriculture

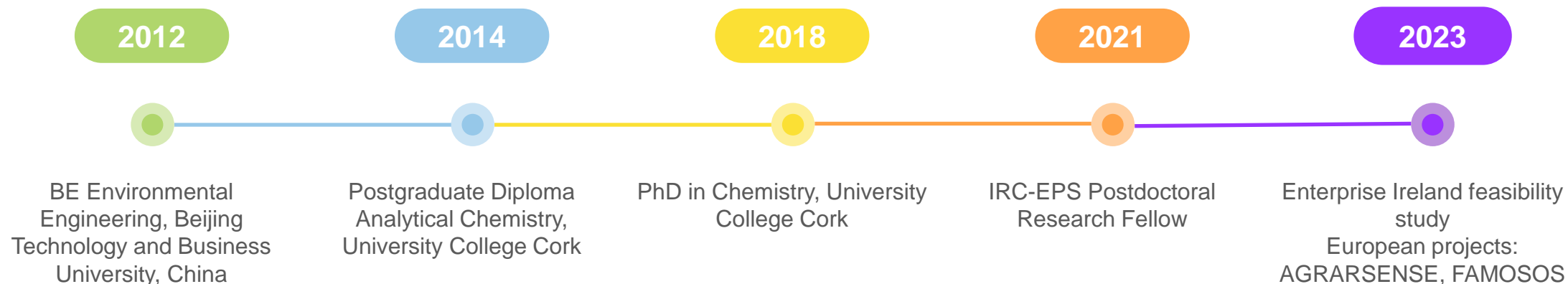
Women in STEM Summit 2024, Croke Park, Dublin

Dr. Han Shao

Tyndall National Institute

13/03/2024

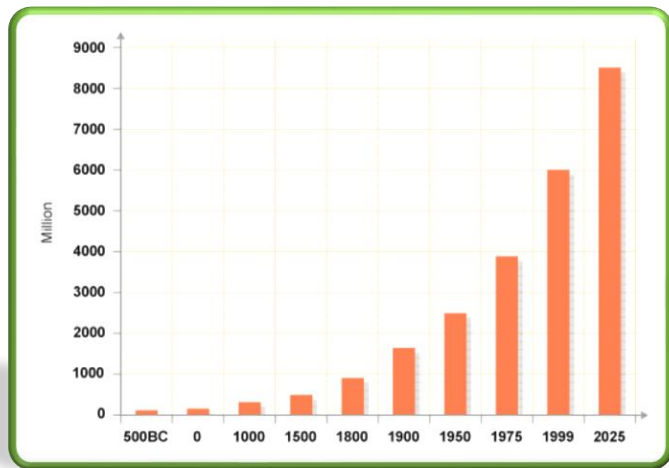
Career Development



- H-index = 12, FWCI = 1.53, Total No Citations, 739. Highest 178
- Academic collaborator in VistaMilk I (Science Foundation Ireland Research Centre)
- Funded investigator in VistaMilk II
- Core team member of SSI (EU smart system integration)
- WiSe co-chair on IEEE APSCON 2024
- Tyndall EDI team member
- Evening Echo Women on Wednesday 22/02/2023 [derefer \(truehawkmedia.ie\)](https://www.truehawkmedia.ie)
- University College Cork International Women's Day campaign 2024

Why Agri Tech

Motivation: Food Production +70% by 2050



Climate Change



Competition for land



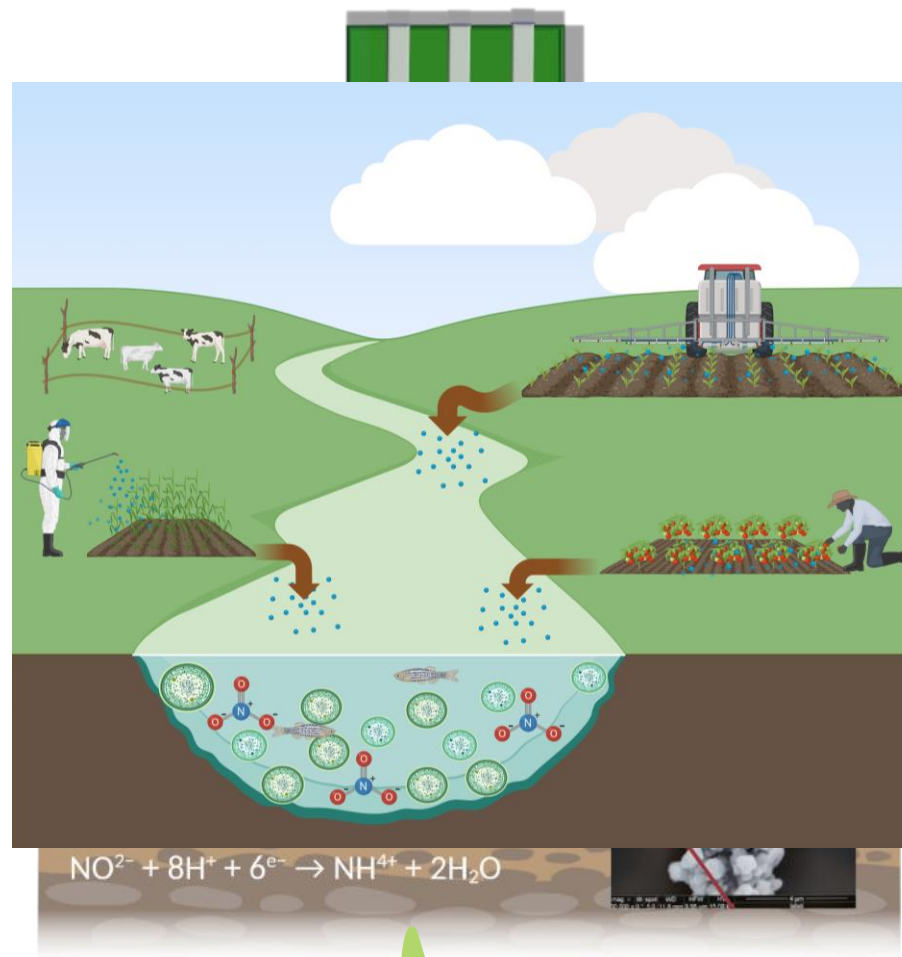
Loss of Biodiversity



Problem

Overuse of nitrates in agriculture leading to increased costs and environmental risks for farmers!

- No real-time monitoring of soil nutrients.
- Detrimental impact on soil fertility, decreases biodiversity, run-off polluting water supplies.



Solution

Multi-sensor nanotechnology platform for *in situ* real-time soil analysis

- Data-driven insights, leading to informed nitrate usage by farmers
- Significantly reduces costs
- Increases output yield
- Dramatically reduces pollution caused by nitrate run-off

Research Excellence to Impact



Comparison to Current

	Current Method	Smart Sensors
Equip Cost	Very high	Low
Analyze Time	Hours to days	Secs
Tech Barriers	Highly trained personnel	Simple, maintenance free
Analytes	Single species	Multiple sensors



Field Validation

Commercial farm – continuous monitoring for over 6 months



Stakeholder Engagement

- Famers
- Dairy Co-op
- Fertiliser Companies
- Public Sector
- Food Companies
- Golf Courses
- Researchers



Intellectual Property

Jun. 2017 – Sensor chip design patent granted, US9671432B2

Jun. 2023 – New patent submitted (UK2309536.7)

Commercialization Pathway

Product Launch
Q2 2026





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