



Quantum Proteins: A Potential Breakthrough in Biology

Description

Crystal jellyfish create a faint green glow due to a natural protein. Scientists have used a similar green fluorescent protein (GFP) to examine cellular activities for many years. Now, researchers are exploring how these fluorescent proteins can be adapted for quantum computing. Peter Maurer, a quantum engineer at the University of Chicago, explains that these proteins can be transformed into basic units of quantum information called qubits.

Fluorescent proteins are essential tools in biology. They help scientists see where proteins are located, understand cellular conditions, and check how drugs work. Researchers believe using quantum properties will lead to new opportunities. Quantum sensors can detect tiny signals from active neurons or identify small amounts of free radicals that may indicate cellular stress or cancer.

Despite their potential, developing protein-based quantum sensors is still in its early stages. However, the researchers are optimistic, as many proteins needed are readily available and the equipment to modify them is common. Ania Jayich, a physicist, notes that the technology is moving towards practical applications.

One promising area is the use of enhanced yellow fluorescent protein (EYFP), which shows properties suitable for quantum sensing. Although challenges exist, such as the fragility of fluorescent proteins, researchers are working to improve their sensitivity and durability for future applications in biology and medicine.

Vocabulary List:

1. **Crystal** /'krɪs.təl/ (noun): A clear solid substance with a regular shape.
2. **Jellyfish** /'dʒɛl.i.fɪʃ/ (noun): A soft sea creature with a jelly-like body.
3. **Glow** /gləʊ/ (verb): To shine with a soft light.
4. **Protein** /'prəʊ.ti:n/ (noun): A substance in food needed for growth.
5. **Fluorescent** /flɔ:'rɛs.ənt/ (adjective): Giving off bright light when exposed to certain things.
6. **Researchers** /rɪ'sɜːr.tʃərz/ (noun): People who study or investigate topics deeply.

Comprehension Questions



Multiple Choice

1. What do crystal jellyfish create that causes them to glow?
Option: Green fluorescent protein
Option: Blue fluorescent protein
Option: Red fluorescent protein
Option: Yellow fluorescent protein
2. What are the basic units of quantum information called?
Option: Neurons
Option: Qubits
Option: Atoms
Option: Photons
3. Who is a quantum engineer at the University of Chicago?
Option: Ania Jayich
Option: Peter Maurer
Option: Richard Feynman
Option: Albert Einstein
4. Which fluorescent protein is noted for being promising in quantum sensing?
Option: Green fluorescent protein
Option: Enhanced yellow fluorescent protein
Option: Red fluorescent protein
Option: Blue fluorescent protein
5. What do fluorescent proteins help scientists understand?
Option: Weather patterns
Option: Celestial navigation
Option: Cellular conditions
Option: Quantum mechanics
6. What can quantum sensors detect from active neurons?
Option: Large signals
Option: No signals
Option: Tiny signals
Option: Loud sounds



True-False

7. Fluorescent proteins are unimportant tools in biology.
8. Peter Maurer is involved in adapting fluorescent proteins for quantum computing.
9. Researchers have already perfected protein-based quantum sensors.
10. Quantum sensors can identify small amounts of free radicals.
11. The technology for protein-based quantum sensors is stuck and shows no progress.
12. Enhanced yellow fluorescent protein is considered unsuitable for quantum sensing.

Gap-Fill

13. Crystal jellyfish create a faint green glow due to a natural protein called _____ .
14. Researchers are exploring how fluorescent proteins can be adapted for _____ computing.
15. Fluorescent proteins help scientists see where proteins are located and understand _____ conditions.
16. Quantum sensors can detect tiny signals from active _____ .
17. Developing protein-based quantum sensors is still in its _____ stages.
18. One promising area is the use of _____ yellow fluorescent protein.

Answer

Multiple Choice: 1. Green fluorescent protein 2. Qubits 3. Peter Maurer 4. Enhanced yellow fluorescent protein 5. Cellular conditions 6. Tiny signals

True-False: 7. False 8. True 9. False 10. True 11. False 12. False

Gap-Fill: 13. green fluorescent protein 14. quantum 15. cellular 16. neurons 17. early 18. enhanced



Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. What is usually tested to ensure systems can work together?
Option: capability
Option: compatibility
Option: scalability
Option: reliability
2. What term refers to the permanent software programmed into a hardware device?
Option: software
Option: firmware
Option: malware
Option: application
3. What do we call materials or assets that can be utilized for various purposes?
Option: tools
Option: resources
Option: assets
Option: infrastructure
4. What term describes a journey undertaken for a specific purpose, often exploration?
Option: quest
Option: expedition
Option: mission
Option: voyage
5. What do we call the alteration of the original shape or appearance of something?
Option: distortion
Option: representation
Option: clarity
Option: alignment
6. What is the type of electricity that remains stationary until discharged?
Option: current electricity
Option: dynamic electricity
Option: static electricity
Option: induced electricity
7. What term is used to refer to sound waves with a lower frequency?



- Option: high-frequency
- Option: mid-frequency
- Option: low-frequency
- Option: ultrasonic

8. What is created around a magnet or a current-carrying conductor?

- Option: electric field
- Option: gravitational field
- Option: magnetic field
- Option: radiation field

9. What technology allows users to control devices through spoken commands?

- Option: remote control
- Option: manual control
- Option: voice control
- Option: fingerprint control

10. What term refers to areas located near the shore of a sea or ocean?

- Option: interior
- Option: rural
- Option: urban
- Option: coastal

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. The issue between the two parties was finally _____ after extensive discussions.
12. There has been significant _____ in technology over the past decade.
13. The new software is focused on _____ user experience and interface.
14. The unexpected _____ of the building shocked the entire city.
15. Language can often act as a _____ to effective communication.
16. Investigation was crucial to _____ the truth behind the incident.
17. The event was exclusive and required an _____ to attend.
18. Players were thrilled to receive _____ to the highly anticipated game.



19. The team is focused on _____ the data for better analysis.
20. The software update fixed several critical _____ that were affecting performance.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

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| 21. The whistler can produce a variety of melodic tones that are pleasing to the ear. |
| 22. Solar wind consists of charged particles released from the sun's atmosphere into space. |
| 23. Jellyfish are fascinating creatures known for their translucent bodies and ability to drift through water. |
| 24. A crystal is a solid material whose atoms are arranged in a highly ordered structure. |
| 25. The glow of the phosphorescent material illuminated the dark room beautifully. |
| 26. Proteins are vital macromolecules that perform a variety of functions in living organisms. |
| 27. Researchers are constantly exploring new methods to improve scientific understanding. |
| 28. Electromagnetic waves include a spectrum of radiation such as radio waves, microwaves, and X-rays. |
| 29. Static electricity can be observed when one rubs a balloon on their hair and it makes the hair stand up. |
| 30. A magnetic field is generated by moving electric charges and can influence the behavior of other magnets. |

Answer

Multiple Choice: 1. compatibility 2. firmware 3. resources 4. expedition 5. distortion 6. static electricity 7. low-frequency 8. magnetic field 9. voice control 10. coastal

Gap-Fill: 11. resolved 12. progression 13. enhancing 14. collapse 15. barrier 16. expose 17. invite-only 18. early access 19. categorising 20. bugs

Matching sentence: 1. whistler 2. solar wind 3. jellyfish 4. crystal 5. glow 6. protein 7. researchers 8. electromagnetic 9. static electricity 10. magnetic field

CATEGORY

1. Sci/Tech - LEVEL3

POST TAG



1. B1
2. biology
3. ESL learning
4. esl news
5. Level 3
6. quantum proteins

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