

NANOTECHNOLOGY

Nanotechnology rests on mankind's newfound ability to manipulate matter at the smallest scale. It has been hailed as 'the next industrial revolution' because it is poised to impact every single aspect of society.

A)

Nanotechnology is the science of designing, producing and using structures and devices that are 100 nanometres or less in size. **1** To get some idea of just how miniscule this is, just consider that the paper you're reading this article on is about 100,000 nm thick! It is only in the last quarter of a century that scientists have possessed the technology that allows them to modify matter at this scale.

B)

2 For example, insoluble materials suddenly become soluble, opaque substances become transparent, nonconductive materials start conducting electricity, and brittle materials become super-strong. The properties of matter at the nanoscale can be used to produce materials and devices that have practical and unique properties. For example, adding nanoparticles of clay to plastic makes plastic stronger, less permeable to oxygen and moisture, and more heat-resistant.

C)

Although nanotechnology might sound like something from a sci-fi novel, it is not a technology-in-waiting.

3 Nanomaterials are currently being used to strengthen steel and concrete, keep dirt from sticking to windows, kill bacteria on hospital walls, make materials fire-resistant, and even allow buildings to repair any cracks that could otherwise cause structural failures.

Nanomaterials could even be in your body right now! Doctors can now accurately target certain drugs to the areas of the body where they are needed thanks to specially-designed drug-carrying nanoparticles!

D)

4 For instance, scientists are currently researching how nanotechnology could help in the production of inexpensive and nutritious foodstuffs. Some even say that nanotechnology could have a greater impact on food production than GM food technology. **5** For example, recent research has shown that adding certain nanomaterials to solar panels can significantly increase the amount of solar energy they acquire.

E)

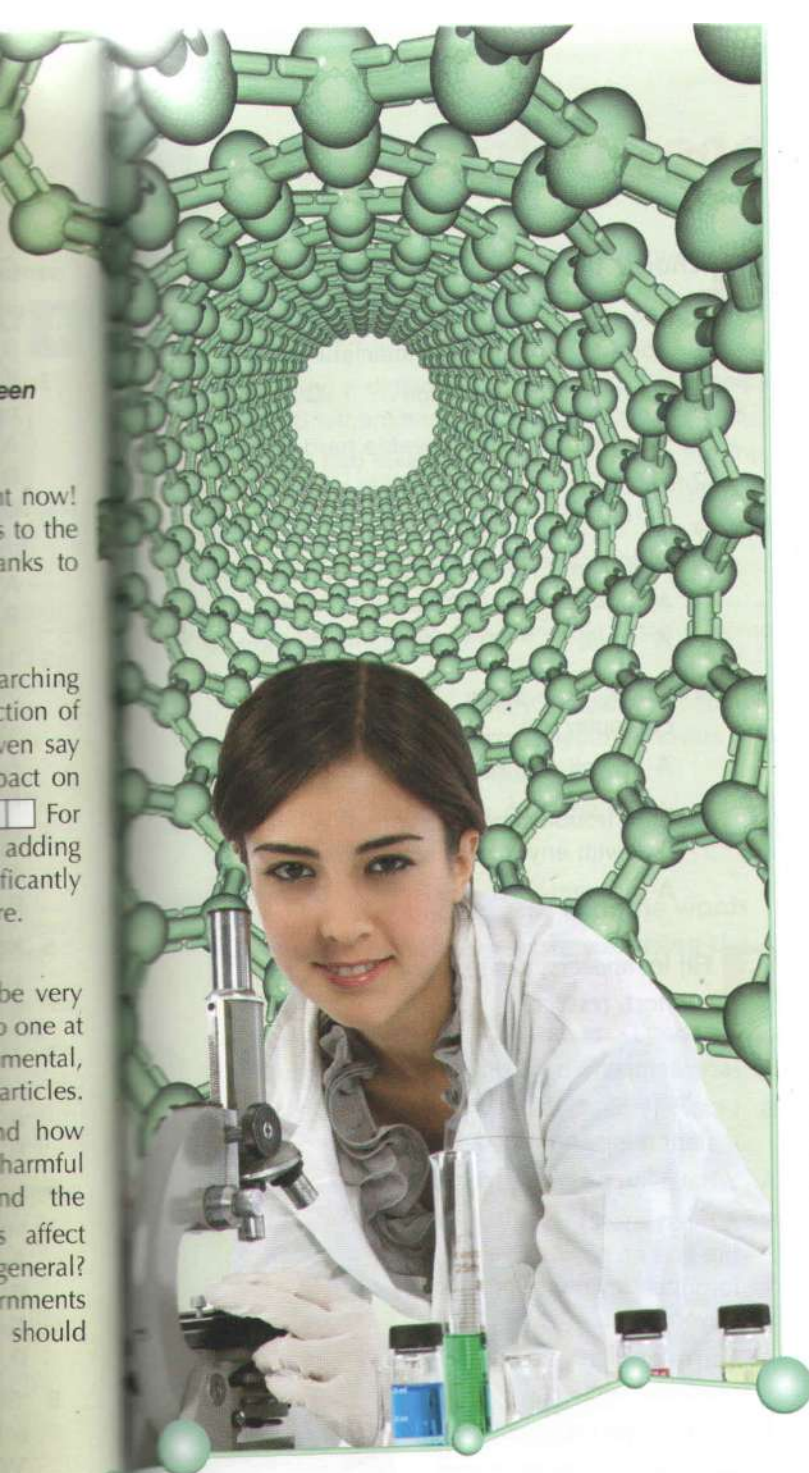
Nanotechnology clearly has the potential to be very beneficial to society. But - and it's a big but - no one at present really knows if significant environmental, health and safety problems are posed by nanoparticles. At present, scientists do not fully understand how nanoparticles behave in living systems, or the harmful potential of nanoparticles in humans and the environment. **6** How will nanoparticles affect plants, waterways, and the environment in general? Recognising the seriousness of the issue, governments around the world are funding research that should soon provide answers to these questions.

1 You are going to read an article about nanotechnology. Six sentences have been removed. Choose from the sentences A-G the ones which fits each gap (1-6). There is one extra sentence which you do not need to use.

- A It is here now.
- B Also, nanotechnology has the potential to vastly improve the efficiency of sources of renewable energy.
- C Will inhaled or ingested nanomaterials have a detrimental effect on human health?
- D One nanometre (nm) is one billionth of a metre.
- E In the future, there are no limits to the benefits that nanotechnology could bring to our lives.
- F Experts hope that it won't be too long now.
- G At the nanoscale, matter often takes on new and unexpected properties.

2 Read the text and match the headings (1-6) to the paragraphs (A-E). Use each heading once. There is one extra heading.

- 1 Surprising changes
- 2 Things to consider
- 3 Really tiny
- 4 Century old science
- 5 Proven successes
- 6 Potential uses



Τον, ηθο, ηπορουνας

5 Fill in: permeable, unique, soluble, newfound, beneficial, transparent, structural.

- 1 She always carries her sandwiches in a(n) glass container.
- 2 The Internet is a very tool to companies who wish to sell internationally.
- 3 This water is high in mineral content because it has passed through rocks.
- 4 The tablet is; just put it in some water and it will dissolve.
- 5 The teenage popstar found it difficult to cope with her fame.
- 6 The earthquake caused minor damage to the school building.
- 7 It was a(n) film; I've never seen anything like it before.

6 Complete the summary with words from the list.

- governments • issue • properties • safe
• scale • renewable • science • stronger

Nanotechnology is a

- 1) that involves working with matter at an extremely small
- 2) At the nanoscale, matter takes on different
- 3) which can be put to a number of different uses. For instance, adding nanomaterials of clay to plastic can make it considerably
- 4) These days, nanotechnology is used in a number of different industries and in the future it could help in the production of
- 5) energy. However, scientists are still unsure whether nanotechnology is entirely
- 6) Because of this
- 7) are funding research into the 8) the results of which should be available soon.

3 Find words in the text with a similar meaning to the following words/phrases.

- Para 1: owned, to change slightly +
- Para 2: easily broken, ways of behaving f
- Para 3: fix, precisely +
- Para 4: restrictions, effect f
- Para 5: eaten, harmful, providing money f

4 Find words in the text which mean the opposite of the following words.

- removing • enormous • predictable
- weaken • costly

6b

Vocabulary

1 Fill in: *search, human, artificial, research, helping, identity.*

- 1 The university formed a team with some of the world's most renowned scientists.
- 2 Robots may one day have the intelligence to interact with people, but they will never acquire the emotional skills to bond with them.
- 3 Using someone else's personal information and pretending to be them is a form of theft and is punishable by law.
- 4 Many people love their pets so much that they treat them like beings.
- 5 When you look for information online make sure you use appropriate words.
- 6 I wish I had a robot that would offer a hand around the house!

2 Fill in: *with, on, up, in (x2), from.*

- 1 Neil finds it easier to communicate his friends via email.
- 2 Speech recognition programs can create text speech.
- 3 Ever since my friend moved abroad, we keep touch through Skype.
- 4 Every time I try to open this file, a warning message comes up the screen.
- 5 How can you expect your modem to work when you haven't plugged it?
- 6 Very few computers can pick Wi-Fi on the island.

3 Choose the correct item.

- 1 I usually **send/take** text messages to my friends instead of calling them.
- 2 You should **check/display** your emails regularly in case the company contacts you.
- 3 Make sure you **print/record** the map so we can take a copy with us.
- 4 Left-click on the icon to **upload/update** the photo onto your homepage.
- 5 It's a good idea to **scroll/surf** online for a better price.
- 6 If you **disconnect/forget** your password, follow the on-screen instructions.

4 Choose the correct answer A, B or C.

- 1 You should add some more folders to your documents more efficiently.
A record B scroll C manage
- 2 I need to buy a removable hard drive to my files.
A create B back up C restore
- 3 You can files from one computer to another using a USB stick.
A hack B update C transfer
- 4 Once you have inserted the CD, the computer will your software.
A install B copy C research
- 5 The troubleshooting option is intended to with any technical problems.
A generate B assist C investigate

5 Fill in: *appears, delete, scroll, access, click, connect, restart.*

- A: Hey, James. What's up?
B: I can't 1) my instant messenger account.
A: What's the problem exactly?
B: A message 2) on the screen saying I've forgotten my password. But I haven't!
A: You're probably using an outdated version.
B: What do you suggest?
A: First, go into control panel and 3) on Messenger.
B: OK. Now what?
A: 4) the program from your hard drive.
B: OK. Then what do I do?
A: 5) to the Internet and look for updates of the software. When you've done that, 6) down to the newest version and select it.
B: Then I just install it, right?
A: Exactly. 7) the program and see if it will let you in this time.
B: What if it doesn't?
A: Then, I'm all out of suggestions. Check the troubleshooting section.
B: OK. Thanks for your help.



Grammar Bank 5

The passive

Form

We form the **passive** with the verb **to be** in the appropriate tense and the **past participle** of the main verb.

Read the table:

	ACTIVE	PASSIVE
Present Simple	Ben <i>installs</i> a burglar alarm.	A burglar alarm <i>is installed</i> by Ben.
Present Continuous	Ben <i>is installing</i> a burglar alarm.	A burglar alarm <i>is being installed</i> by Ben.
Past Simple	Ben <i>installed</i> a burglar alarm.	A burglar alarm <i>was installed</i> by Ben.
Past Continuous	Ben <i>was installing</i> a burglar alarm.	A burglar alarm <i>was being installed</i> by Ben.
Present Perfect Simple	Ben <i>has installed</i> a burglar alarm.	A burglar alarm <i>has been installed</i> by Ben.
Past Perfect Simple	Ben <i>had installed</i> a burglar alarm.	A burglar alarm <i>had been installed</i> by Ben.
Future Simple	Ben <i>will install</i> a burglar alarm.	A burglar alarm <i>will be installed</i> by Ben.
Infinitive	Ben <i>has to install</i> a burglar alarm.	A burglar alarm <i>has to be installed</i> by Ben.
Modal Verbs	Ben <i>might install</i> a burglar alarm.	A burglar alarm <i>might be installed</i> by Ben.

We use the **passive**:

- when the person/people doing the action **is/are unknown, unimportant or obvious from the context**. *The house **was burgled**.* (We don't know who broke into it).
*A verdict **will be reached** this morning.* (Who will reach the verdict is unimportant).
*The robber **was arrested**.* (It's obvious that the police arrested him).
- when the **action itself is more important** than the person/people doing it, as in **news headlines, newspaper articles, advertisements, instructions, formal notices, processes, etc.** *Bags **mustn't be left unattended**.*
- when we want to **avoid taking responsibility** for an action or when we refer to an unpleasant event and we do not want to say who or what is to blame. *My computer **has been hacked**.*
- to **emphasise the agent**. *The announcement **was made by the Mayor**.*

- to make statements **more formal or polite**. *My wallet **has been stolen**.* (More polite than saying "You stole my wallet.")

Changing from the active to the passive:

- The **object** of the active sentence becomes the **subject** in the passive sentence.
- The active verb remains in the same tense but changes into passive form.
- The **subject** of the active sentence becomes the **agent**, and is either introduced with the preposition **by** or is omitted.

	Subject	Verb	Object
ACTIVE	Palmer	robbed	the bank.
	↓	↓	↓
	Subject	Verb	Agent
PASSIVE	The bank	was robbed	by Palmer.

- Only transitive verbs (verbs that take an object) can be changed into the passive. *The accident **happened on the motorway**.* (intransitive verb; **no passive form**).

Note: Some transitive verbs (*have, fit* (= be the right size), *suit, resemble*, etc) cannot be changed into the passive. *The blue uniform **suits** you.* (NOT: *You are suited by the blue uniform.*)

- Let** becomes **be allowed to** in the passive. *They **let us go home early**.* – *We **were allowed to go home early**.*
- We can use the verb **to get** instead of the verb **to be** in everyday speech when we talk about things that happen by accident or unexpectedly. *The windows **got smashed in the explosion**.*
- By + agent** is used to say who or what carries out an action. **With + instrument/material/ingredient** is used to say what the agent used. *The safe **was broken into by a professional**. It **was opened with explosives**.*
- The agent can be **omitted** when the subject is **they, he, someone/somebody, people, one**, etc. *The building **has been vandalised**.* (= Someone has vandalised the building.)
- The agent **is not omitted** when it is a **specific or important person**, or when it is **essential** to the meaning of the sentence. *The document **was signed by the witness**.*
- With verbs which can take two objects, such as **bring, tell, send, show, teach, promise, sell, read, offer, give, lend**, etc, we can form two different passive sentences.
*She **sent me a mysterious parcel**.* (active) *I **was sent a mysterious parcel**.* (passive, more common)
*A mysterious parcel **was sent to me**.* (passive, less common)
- In passive questions with **who, whom, or which** we do not omit **by**. *Who **wrote this story**? Who **was this story written by**?*

- The verbs *hear, help, see, and make* are followed by a bare infinitive in the active, but a to-infinitive in the passive. *Mum made me apologise.* (active)
I was made to apologise. (passive)

Impersonal/Personal passive constructions

- The verbs *believe, consider, expect, know, report, say, think*, etc have both personal and impersonal constructions in the passive.

active: *People expect that the police will catch the mugger.*

passive: *It is expected that the police will catch the mugger.* (impersonal construction)
The police are expected to catch the mugger. (personal construction)

active: *They say that he was a smuggler.*

passive: *It is said that he was a smuggler.* (impersonal construction)
He is said to have been a smuggler. (personal construction)

1 Put the verbs in brackets into the correct passive form.

- A: Isn't that your neighbour on the news?
B: Yes, he *has been arrested* (**arrest**) for theft.
- A: Do you think your area is safe to live in?
B: Absolutely! The streets (**patrol**) by police officers all day long.
- A: Are the police still looking for your car?
B: No, it (**find**) last night.
- A: Someone painted the mayor's car with spray last week.
B: Again? It (**vandalise**) twice before that.
- A: The police think Mr Smithers is a prime suspect in the murder case.
B: I know. He (**question**) by the detectives as we speak.
- A: Did you get a chance to interview the burglars for your story?
B: No, I got to the scene the moment they (**take**) away by the police.
- A: May I park my car here, officer?
B: No, madam. It (**tow**) away.
- A: What do you think will happen to the kidnappers?
B: They (**probably/ send**) to prison for a long time.

2 Put the verbs in brackets into the correct passive form.

The person responsible for a large number of mindless acts of vandalism around town 1) *was finally caught* (**finally/catch**) yesterday. It 2) (**believe**) that the local community 3) (**shock**) once the culprit's identity 4) (**reveal**) to the public. According to sources, the vandalism 5) (**cause**) by the son of a local celebrity who felt that he 6) (**neglect**) by his parents. The vandalism was an attempt to attract their attention.

A

Calif. Comm. tions of est-ran cials. started. The mally clan into lo's offi- Delg ing Dr ers ar as "I the dress

3 Complete the sentences using the words in bold. Use two to five words.

- Everyone thinks the judge passed a fair sentence. **HAVE**
The judge is *thought to have passed* a fair sentence.
- The police are interrogating the suspects. **BEING**
The suspects the police.
- Security guards protect the bank. **IS**
The bank security guards.
- Vandals used spray to paint the walls. **PAINTED**
The walls vandals.
- The suspect was said to have been hiding abroad before they caught him. **HAD**
It was said the suspect another country before they caught him.

4 Complete the sentences, as in the example.

- People believe that they are guilty.
It *is believed that they are guilty*.
They *are believed to be guilty*.
- Everyone thinks that he isn't telling the truth.
It
He
- A local reported that a woman was crying out for help last night.
It
A woman
- People suspect that he took part in the burglary.
It
He
- People say that thieves burgled the museum.
It
The museum

Causative form

- We use **have + object + past participle** to say that we have arranged for someone to do something for us. *Mr Benson **had his house redecorated**.* (He didn't redecorate it himself.)
- Questions and negations in the causative are formed with **do/does** (present simple) or **did** (past simple) + **have + object + past participle**.
*When **did you have** security locks fitted?*

	ACTIVE	CAUSATIVE
Present Simple	<i>He paints his room.</i>	<i>He has his room painted.</i>
Present Continuous	<i>He is painting his room.</i>	<i>He is having his room painted.</i>
Past Simple	<i>He painted his room.</i>	<i>He had his room painted.</i>
Past Continuous	<i>He was painting his room.</i>	<i>He was having his room painted.</i>
Present Perfect Simple	<i>He has painted his room.</i>	<i>He has had his room painted.</i>
Past Perfect	<i>He had painted his room.</i>	<i>He had had his room painted.</i>
Simple Future	<i>He will paint his room.</i>	<i>He will have his room painted.</i>

Notes:

- We also use **the causative form** to say that something unpleasant or unexpected happened to somebody. *Steven **had his car stolen** last week.*
- We can use **get** instead of **have** only in informal conversation. *You should **get those reports typed up**.*

Clauses of result

Clauses of result are used to express result. They are introduced with the following words/phrases:

- as a result/therefore/consequently/as a consequence**
*He acted quickly. **As a result/Therefore/Consequently/As a consequence**, he managed to catch the pickpocket.*
- such a/an + adjective + singular countable noun ... that** – *It was **such a mysterious crime** that nobody could solve it.*
- such + adjective + plural/uncountable noun ... that**
*They were **such hard working employees** that they were given a pay rise. We were having **such bad weather** that we decided to stay indoors.*
- such a lot of + plural/uncountable noun ... that**
*There were **such a lot of people** at the concert that we couldn't see the stage. There was **such a lot of noise** that he couldn't hear the guest speaker.*
- so + adjective/adverb ... that**
*The plot was **so interesting** that I couldn't put the book down. The thief was running **so fast** that the policeman couldn't catch him.*
- so + adjective + a(n) + noun ... that**
*It was **so hard a task** that we gave up.*

- so much/little + uncountable noun ... that**
*We have spent **so much money** on security cameras that it's a wonder how the thief got into our house. There was **so little time** between the two explosions that people didn't have enough time to escape.*
- so many/few + plural noun ... that**
*There have been **so many burglaries** in the neighbourhood that we've begun to worry. I have **so few days off** that it's not worth going abroad for my holidays.*

5 Complete the exchanges using the causative.

- A: How come Quentin is staying with you this week?
B: He *is having his house painted* (**his house/paint**) and he can't stand the smell.
- A: Why did Jodie go to the police?
B: Because she (**her passport/ steal**) this morning.
- A: Did you get a burglar alarm?
B: Yes, but we (**it/ install**) tomorrow morning.
- A: My computer is making funny noises.
B: You should (**it/check**) by a technician.
- A: Where do you get this amazing tea?
B: I (**it/send**) to me from England every month.
- A: You paid so little for the plane tickets!
B: That's because I (**them/ book**) long before prices went up.

6 Rewrite the sentences using the causative.

- The Police Commissioner asked an officer to email him the offender's file.
*The Police Commissioner **had the offender's file emailed to him**.*
- They have asked a bakery to make their wedding cake.
.....
- Nicole will ask her mother to shorten her curtains.
.....
- A plumber was repairing Ian's kitchen tap.
.....
- A police officer read the arrested man his rights.
.....
- A mechanic services John's car every year.
.....

7 Read the situations and then write sentences using the *causative*, as in the example.

- 1 Famous designers create outfits for Hollywood stars. What do Hollywood stars do? *They have their outfits created by famous designers.*
- 2 The boxer's nose broke during a match. What happened to the boxer?
- 3 Maria will ask her secretary to deliver some documents to a client. What will she do?
- 4 Mrs Kravis has been to an optician, who tested her eyes. What has she done?
- 5 The Fords asked someone to replace their car alarm. What did they do?
- 6 An electrician is repairing Anna's fridge. What is she doing?

8 Choose the correct answer.

- 1 The stray dog to an animal shelter.
A had taken C took
B was taken D was taking
- 2 Valerie's hair looks great now that she
A had cut it C has it cut
B was cut D had it cut
- 3 Mike's car was scratched a sharp object.
A by B from C with D of
- 4 Julie and Daniel want by a professional.
A to have their wedding catered
B having their wedding catered
C to have catered their wedding
D to be catering their wedding
- 5 Jackson to testify in court.
A wasn't let C wasn't allowed
B didn't let D didn't allow
- 6 The boys were made the graffiti from the school walls.
A to clean C to have cleaned
B cleaning D to be cleaned
- 7 It is believed that the stolen painting to an art dealer abroad.
A have sold C has been sold
B has had it sold D has sold
- 8 The crime scene right now.
A has got investigated C is investigating
B is being investigated D gets investigated

9 Fill in: *so, such (a/an), so much/little or so many/few*.

- 1 A: Did you get the tickets?
B: No, there were *so many* people waiting in line that I decided to leave.
- 2 A: Did Monica get a fine?
B: No, it was minor an offence that she was let off with a warning.
- 3 A: There was another break-in down the street last week.
B: What a shame! This used to be safe neighbourhood that we all left our doors unlocked at night.
- 4 A: Do you think they'll find Robert Merdinct guilty?
B: No, he's got money that he'll hire the best lawyers to clear his name.
- 5 A: Will the police continue the investigation?
B: No, they have clues that I think they'll drop it.
- 6 A: Will he stand trial?
B: No, there's evidence that they can't form a case against him.
- 7 A: What do you think the jury's verdict will be?
B: He's done terrible things that there's no way they'll declare him not guilty.

10 Join the sentences using the words in brackets. Add any necessary words.

- 1 The crime rate in the area has increased. Many people are afraid to go out alone at night. (*as a result*) *The crime rate in the area has increased. As a result, many people are afraid to go out alone at night.*
- 2 She had very much work to do. She left the office at 9:00 pm. (*such a lot of*)
- 3 He was acting suspiciously. The police brought him in for questioning. (*so*)
- 4 He had told her many lies in the past. She could no longer forgive him. (*so many*)
- 5 They were found guilty of kidnapping. They received a long prison sentence. (*consequently*)
- 6 She is an unreliable witness. Her testimony will not be taken into account. (*such an*)