Unit 1

Introduction

Part One Dictation

Watch the 3MT sample and fill in the blanks with the exact words that you hear.

Desirable Defects: Nano-scale Structures of Piezoelectrics

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Perfection is *1* _____ _____. Likewise, *2* _____ in piezoelectric materials. Now piezoelectrics are materials that can change their shape when you apply an electric field on them. But you can also *3* _____ _____. This can be used in many cool applications, such as in pacemakers. By *4* _____ _____ that actually power the pacemaker itself, patients don't need surgery every few years, just to change the batteries.

However, across the thirteen-billion-dollar piezoelectric market, over 95% of all piezoelectrics are made with lead, and that's because they *5* _____ _____ today. But obviously, lead is bad because it can *6* _____ _____. And at higher doses, it can even be fatal. So *7* _____ _____. But the problem is that the best lead-free piezoelectrics we have *8*_____.

So, what's the solution?

Well, *9* _____ of these lead-free piezoelectrics. But in order to enhance these properties, we must first *10* _____ _____, atom by atom, and this is exactly what I do.

And the way I do this is I use massive particle accelerators around the world that produce powerful X-rays. I can then *11* _____.

Now *12* _____ _____. However, what we actually find is that the atoms in lead-free piezoelectrics

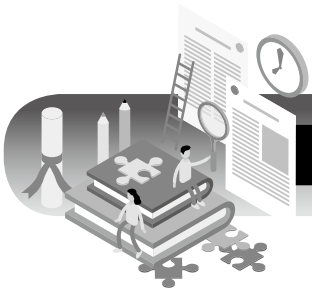
13 _____, with defects throughout the whole material. *14* _____, atoms moving away from where they usually sit, and *15* _____, and these are the things that *16* _____.

So *17* _____, we can implement these and engineer new materials, *18* _____ _____ all piezoelectrics.

So it turns out piezoelectrics *19* _____. It's *20*_____ _____. (360 words)

Answers

1 something that many people strive for
2 we also strive for perfection
3 generate electricity when you change their shape
4 using the movement of a beating heart to recharge the batteries
5 provide the best properties that we are aware of
6 lead to both cognitive and behavioral problems
7 we need an alternative
8 are nowhere near as good as the lead-based ones we have
9 one solution is to enhance the properties
10 understand how they work fundamentally at an atomic level
11 use these X-rays to look at the atomic structures within these materials
12 usually atoms in a material are perfectly ordered, just like the seats in this hall
13 are completely disordered
14 We see things like mismatching layers of atoms
15 smaller atomic structures forced within larger ones
16 actually contribute to those properties
17 now that we understand the mechanisms behind it
18 so that eventually we can replace lead from
19 are just like people
20 the imperfections that make them interesting



Part Two Speaking Skill

Introduction

A good way to begin learning academic writing and speaking skills is by studying 3-minute thesis (3MT) speech samples. 3MT is a speech competition originating in the University of Queensland in 2008. In the competition students must explain their research to a non-specialist audience in 3 minutes. Nowadays 3MT competitions are held in over 600 universities across more than 65 countries worldwide. Many 3MT winners' video clips are available online. These video clips are good learning materials for advanced English learners. In this course, we are going to find out what makes their speeches stand out. We will learn new vocabulary. We will also learn the structure of a 3MT speech, and some speaking skills. More importantly, we will put these to use—to practice giving 3-minute thesis speeches. We hope at the end of the course you will know the basics of how to give a clear, fluent, coherent and concise 3-minute speech.

A 3MT speech is a general report of the presenter's research work, and therefore, it should include all the five key elements of the research, i.e. **context**, **purpose**, **methods**, **results** and **discussion**. If you examine the speech that we have watched just now, you will find that all these five key elements are presented.

The time allowed for a 3MT is only 3 minutes and the speech is aimed at a non-technical audience, so each of these elements must not only be summarized in non-technical language but also compressed, so that only the core information is retained.

The **context** section introduces the research topic, elaborates the key concepts, explains the problem the research addresses, reviews existing studies and identifies a gap that the research bridges. Often, after a speaker identifies a gap in the existing works, he will tell the **purpose** of his work in one or two sentences.

The **methods** section is probably the most technical part of a research paper. Therefore, a 3MT speaker needs to be careful to make it accessible to a non-technical audience. In this course we will see how the best 3MT speakers achieve this.

The **results** section tells the audience how the researcher helped to bridge the gap that they had identified in the context section and what the bridge looks like.

Finally, the **discussion** section states the significance and limitations of the study and makes suggestions for future research.

While watching various 3MT sample videos and reading their transcripts, we will identify the five key elements in each speech and study the language that the speakers use.

Part Three Note-Taking

Watch the video again and find out the five KEY ELEMENTS of the speech.

Context:

Purpose:

Methods:

Results:

Discussion:

Part Four Useful Chunks

Translate the following chunks into English and learn them by heart.

1. 很多人追求的东西 _____
2. 我们也追求完美。 _____
3. 通过改变形状来发电 _____
4. 利用心脏跳动为电池充电 _____
5. 提供目前我们所知的最佳性能 _____
6. 导致认知和行为问题 _____
7. 我们需要别的办法。 _____
8. 远不及我们现有的铅基压电材料 _____
9. 其中一个办法是增强性能。 _____
10. 了解它们在原子层面上的工作原理 _____
11. 用 X 射线来观察这些材料的原子结构 _____
12. 通常，物质中的原子是完全有序排列的，就像这个大厅里的座位一样。 _____
    _____
13. 完全不规则排列 _____
14. 我们看到了错位的原子层。 _____
15. 小一点的原子结构被挤压到更大的结构中 _____
    _____
16. 正是这些缺陷赋予了压电材料特有的性质。 _____
17. 既然我们了解了它背后的原理 _____
18. 最终，我们可以把铅从所有压电材料中去除。 _____
    _____
19. 压电材料就像人一样。 _____
20. 正是不完美让它们变得有趣。 _____

Part Five Translation

完美的缺陷：压电材料的纳米尺度结构

人们都追求完美，对于压电材料也是一样。当你给压电材料施加电场时，它们会改变形状。反过来，你也可以通过改变它们的形状来发电。它有很多很出色的用途。例如，在心脏起搏器中，它能利用心脏跳动为起搏器充电。这样，病人便不需要每隔几年就仅仅为了更换起搏器电池而做一次手术。

然而，在体量为 130 亿美元的压电材料市场上，95% 以上的压电材料都由铅制成。这是因为铅能提供目前我们所知的最佳性能。但铅明显对人体有害，因为它会导致认知和行为问题。在剂量大的情况下，它甚至是致命的。所以，我们需要找到它的替代品。但问题是，现存最好的无铅压电材料性能远不及我们现有的铅基压电材料。

那怎么办?

其中一个办法是增强无铅压电材料的性能。为了实现这一目的，我们必须首先了解它们在原子层面上的工作原理，而这正是我的研究领域。

我的方法是，在世界各地使用大型粒子加速器，以产生强大的 X 射线，然后我使用这些 X 射线来观察材料的原子结构。

通常，物质中的原子是完全有序排列的，就像这个大厅里的座位一样。然而，我们发现，在无铅压电材料中，原子是完全无序的，整个材料都有缺陷。在这种材料中，我们看到了错位的原子层，原子远离原来的位置，小一点的原子结构被挤压到更大的结构中。正是这些缺陷赋予了压电材料特有的性质。

既然我们了解了它背后的原理，我们便可以运用这些原理，设计新的材料。最终，我们可以把铅从所有压电材料中去除。

压电材料就像人一样。正是不完美让它们变得有趣。

Unit 2

Structure

Part One Dictation

Watch the 3MT sample and fill in the blanks with the exact words that you hear.

Language and the Brain: *The Skye's the Limit*

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（英国爱丁堡大学）

By the time I finish this three-minute talk, *1* _____ _____, and someone else will develop dementia. And these numbers *2* _____ _____. But I have some good news. What if I told you that there is something that can *3* _____ _____from a stroke, and *4* _____ by five years? It's not *5* _____.

Why is that?

Different theories have been proposed, but one of the most *6* _____ _____builds what is known as cognitive reserve, which *7*_____. Now as fascinating as these findings are, what about those of us who didn't grow up with another language? *8* _____ _____.

I want to know *9* _____ later in life, and how soon we can see results. To test this, I went to the Isle of Skye to a Gaelic college offering one-week intensive courses. I tested people before and after the week, and found that they *10* _____ _____.

Now I know what you are thinking. It *11* _____, right? Not quite. I used the same test on people involved in other intensive courses, and the results were different. *12* _____Gaelic learners. And it's not just Gaelic. Here in Edinburgh, I tested people learning Norwegian, a language very similar to English, and Turkish, very different, and *13* _____