Due to the scarcity of land resources on Earth in the future, the United Nations, in order to improve the living environment of the planet, has set up the Siberian underground. The United Nations gathered the scientific and technological power of countries around the world, set up this underground science and technology research city ---- Mirakorum. The city has hundreds of scientific laboratories and technology companies of all sizes, and is surrounded by residential areas, which, despite their prosperity, are always hustling and bustling, as the main orientation of the city is scientific and technological research. When night falls, the city falls silent, with colorful neon signs and street lamps illuminating the city as bright as day, but the streets with few people are also very quiet under the lights.

At this time, the silent subway station in the corner of the city was filled with the bright laughter of a few teenagers. The night breeze lifted the hair of a young girl resting on the platform railing; she wore a white baseball cap, the bangs under the hat down over the left eye. At the moment, she was with his friends, admiring their newly completed graffiti, a dozen cans of spray paint and colorful canvases strewn on the floor. Suddenly the phone rang, and after a quick glance at the incoming call and a quick look at the clock - it was after eleven o'clock - Estero picked up the side of her skateboard and got up to say goodbye to her friends. As she stepped on her skateboard, she picked up the phone, and there was the impatient voice of her sister, Osbertiris, on the other end of the line: "Sister, it's already so late, so hurry back to the lab, I have something to tell you." Before Istero answered, the other end of the phone had already hung up. Despite her ten thousand reluctances, she stepped up her pace to get back to the lab for the sake of the monthly pigment bill.

Istero took the last light rail, and it was a comfortable night. A cool evening breeze inserted into the sultry summer heat was refreshing. Leaning his head against the glass of the last car of the light rail, Istero watched as the light rail rumbled past the quiet, leaving the suburbs for a moment of peace and quiet, and rumbled on to University City. Staring off into the distance with her right eye uncovered by hair under her baseball cap, it was as if she was still nostalgic for the smooth graffiti and laughter she had just had with her friends. Little did the poor girl know that for a long time to come, her dear sister, Osbertiris, would "imprison" her with an ambitious laboratory project, forcing the doodling girl, who saw her life as her own, to work around the clock in the lab. But that's all later, and our Istero is still dreaming about tonight's supper, whether it will be rice balls or a delicious guandan-cooked meal. The light rail stopped at the university station, and Istero got on her skateboard and glided effortlessly across the sidewalk, across campus, and into her agonizing "lab hell".

Although it was only a university lab, Osbertiris's lab was one of the most high-tech materials labs in the city. The laboratory had a wide range of equipment, including gas-sensitive circuit systems, test tube vibrators, vacuum furnaces, material analyzers, and even several auxiliary devices designed and put into use by Osbertiris herself. Istero swiped his access card and dragged his

steps, slowly putting on his footgear, through the air shower doors and into the heart of the lab. Istero entered the room, where the incandescent lights were bright and a little hard to keep her eyes open. The computer on the desk was on, but Osbertiris was nowhere to be seen. Estero was sitting at her sister's work station, looking around and whistling pleasantly. Suddenly, she felt a shiver run down her back, when a ghostly "sister" came from her, and when she looked back, she saw that it was her sister Osbertiris. She was wearing a white and red striped short-sleeved shirt and navy blue jeans, holding a writing pad and pen, and looking at Istero with a ghostly look. The gaze beneath the safety glasses had the softness of a young girl's, but revealed a maturity that didn't match her nineteen-year-old age due to rigor and perseverance. Istero was about to open his mouth to greet his sister, but Osbertiris opened her mouth: "We are all sisters, no need to be so formal, Istero, let's hurry up and look at this new project, we don't have much time left." Istero shook his head easily as he took the safety glasses from his sister, "What, there are still projects that can make my sister so anxious? What god could be so hard on my sister?" Osbertiris looked serious: "This project is no small feat, if successful, it will be a great advancement in human health and environmental protection" she pressed a button on her safety glasses to project a virtual screen in mid-air, this was the lab's most advanced sixth sense technology, blending reality and virtual to a certain extent. The entire system consists of a "safety goggle," a small camera, a set of miniature projectors, and sensors. This can be done directly on the screen using your hand to mark the time, and if you want to check the time, make a circle on your arm and a virtual watch will appear to show the time. If you want to make a phone call, just switch the screen to talk mode at ... In short, this high-tech product greatly facilitated the researchers in the lab, and due to the scarcity of production, it wouldn't be seen in any other place other than the lab. "You know, with the New Crown epidemic raging, masks have literally become a hot topic! Masks are being snatched up like crazy, and it's been documented that the world now consumes millions of masks a day! The disposal of discarded masks has become a big problem, so that's why we..." Istero hurriedly interrupted Osbertiris and said in a difficult manner: "I don't even know much about the composition of masks, how can I help you with your project ah, so I see this project, it's better for you to do it yourself, your little brain, so smart..." Before he finished speaking, Osbertiris gave his sister a blast and chided, "I'll teach you if you don't understand, sister, don't flee in the face of difficulties, if you don't learn, how can you progress? Tonight, I called you here, I also want to tell you about the composition and preliminary use of the mask, so that you can learn expertise and can help me in the next experiment ah." Istero sat reluctantly in his chair, which let their sisterly bond, well, she thought: I've been thoroughly manipulated by Osbertieri.

Osbertiris cleared her throat, as usual, has been serious meticulous, said: "Medical masks are generally composed of melt-spray fabric, non-woven fabric, mask band, and nose clip, of which the outer and inner layers are made of

non-woven fabric, and the middle layer is made of melt-spray fabric. The outermost layer of the mask with anti-foam design, the middle layer is the core functional layer, used to filter droplets, particles or bacteria, the inner layer mainly moisture absorption. Of these, the meltblown cloth is the most important for the mask. "So why is the meltblown cloth so important," asks Isteros. Isn't its structure indispensable for a mask?" Osbertiris nodded approvingly, "That's right, let me tell you about it. Melt blown fabric is the core material of the mask, mainly made of polypropylene, and the diameter of the fiber can be 1~5 microns. More gaps, fluffy structure, good anti-wrinkle ability, with a unique capillary structure of the microfiber to increase the number of fibers per unit area and surface area, so that the meltblown cloth has good filtration, shielding, heat insulation and oil absorption. It can be used in air and liquid filtration materials, barrier materials, absorbent materials, mask materials, thermal insulation materials, oil absorbent materials and wiping cloths." Istero nodded: "I know, there is no charge of the adsorption effect, bacteria and germs and other germs easily go into the body with the inhalation, there is no effect of blocking bacteria fungus pathogenic bacteria." Osbertiris smiled and said: "Very good, I will talk about the current state of the mask's use, and I believe that you will have new knowledge, sister." Istero smiled: "Is my sister underestimating me, how could I be frightened by a small mask?" Osbertiris said: "I'll take China, the world's most populous country, which has 997,000 health care facilities in 2019. The frontline workers working in these health facilities need at least two masks a day, because the duration of a surgical mask is four hours. And how many healthcare workers are there in the country? According to the Statistical Yearbook, there are 12.3 million medical workers in all types of health facilities, that's 24.6 million masks." Istero muttered:- "That sounds okay..." Osbertiris: "And the populace! Now that the epidemic is spreading more severely and the country is under strict control, the traveling public will be wearing masks and even stocking up on them just in case. According to the data released in 2018, the population of China is 1.395 billion people, and now of course not everyone will go out during the epidemic, so let's base it on one person traveling per family per day. It's hard to find data on families, so let's calculate here according to the 430 million households in the China Family Development Report 2014 released by the National Health and Family Planning Commission, where each family travels one person per day to buy necessities, then the number of travelers is 400 million. Considering that the epidemic is quite tense right now, many people will buy almost a week's worth of necessities at a time, and subtracting another 50% here, based on 200 million people going out, and adding in quasi-just-in-time health care workers, the approximate daily consumption of masks in China is 200 million + 24.6 million = 224 million masks." Istero was surprised.

"With such a large production of masks, disposal after use would be a problem, right?" Istero asked curiously. Osbertiris smiled after hearing that, "The disposal of the discarded masks is really quite crucial, because the masks only have the effect of blocking bacteria, not sterilizing and disinfecting, so if we don't

effectively dispose of the masks after use, there is still a risk of health hazards." "And what exactly should we do about it?" Istero pursued. Osbertiris sighed and said, "That's a long story eh." She said, picking up a disposable medical mask and demonstrating: "After using the mask, take it off, hold it inside the mask (note: the side close to your face), fold the mask in half, and be careful not to touch the outside surface of the mask with your hands, because the mask may have viruses or bacteria attached to it, and touching it may contaminate your hands. Use an ear trip to trip the mask and wrap it 2-3 times, using the remaining rubber band to tighten the mask. After folding, wrap the mask tightly with an elastic band, spray the mask with alcohol and place it in a garbage bag to seal the bag. If the mask is taken off in a public place, the same steps as above, then throw the mask in the trash can dedicated to the disposal of port masks, and a professional will take these discarded masks to a special place to burn and disinfect them." Istero was shocked again after hearing this: "The original masks disposal is so complicated!" But Osbertiris sighed and said, "Yet few people can follow these steps in full."

Istero asked again: "Then if you directly iron the mask with boiling water can you achieve the same effect? This would be a much simpler procedure." Osbertiris looked at her brother and replied helplessly, "How is that possible? It is true that high temperature is one way to disinfect, such as boiling, and it is simple and easy to do. But using boiling water to scald a mask definitely requires placing the mask on a container or countertop to avoid contaminating the container or countertop; secondly, boiling water is not enough to meet the constant high temperature needed for disinfection, nor is it enough time, and may only kill some of the pathogens." Nodding his head in what looked like understanding, Osbertiris continued, "Any type of mask, the protection is time-sensitive and must be replaced regularly, it is recommended to replace the mask every 2-4 hours, and if the mask is contaminated, it should be replaced at the first opportunity." Istero nodded vigorously:- "I see then, but if no one does what you say, how will it affect the environment?" Osbertiris replied: "There could be aerosolization (creating airborne particles) or a small amount of viruses spreading through the air" It dawned on Istero...

Istero: [frowning] "In that case, what is the solution to so many problems? We can't just let it go, can we?"

Osbertiris: [Raising her head slightly proudly] "That's what I'm working on. I'm going to use a substance called bacterial cellulose to replace the polypropylene melt-spray fabric of traditional masks, and I'm not the only one, you're going to help too, sister~" [Making a threatening gesture]

Estero: [covers face, mind: miserable, can't get away] "Don't. I don't even know what bacterial cellulose is yet."

Osbertiris: [looks like I knew you'd say that] "Well. Bacterial cellulose is the generic term for cellulose synthesized under different conditions by certain microorganisms in the genera Acetobacter, Agrobacterium, Rhizobium, and Sarcina, and is unadulterated natural cellulose. How's that? Will you promise me

now?" [Laughs]

Estero: [frantically shaking his head 'I'm not listening I'm not listening'] "Then I don't know what it's like, how it's being used!"

Osbertiris: [stall hand 'you from the bar'] "As for the structure of bacterial cellulose, is 3 ~ 4 nm in diameter by the combination of microfibrils into 40 ~ 60 nm thick fiber bundles, and interwoven to form a well-developed ultrafine network structure, not only, it also has a good hydrophilic and permeability! ."

Estero: [giving up the resistance] "Well then. Why is that?"

Osbertiris: [scheming, laughing] "This is because bacterial cellulose has a large number of hydrophilic groups within it, inter- and intra-molecularly connected by hydrogen bonds, which determines that bacterial cellulose is a hydrogel. The purified cellulose network has many pore channels that allow for good water and air permeability. You really need to get a chance to read up on it, sister!"

Istero: [OMG 'don’t look to detain me again.' Inside: cry] "I've got it in the reading. Don't say that, tell me more about that bacterial cellulose of yours."

Osbertiris: [Clasping her hands around her chest? Front, straighten up] "Another property of bacterial cellulose is that it is biodegradable and reusable. Under natural conditions, microorganisms can degrade cellulose into small molecules of sugar, which will not cause environmental pollution. Bacterial cellulose for renewable and biodegradable biological resources, for the construction of a green national economy is of great significance. So, the research we have to do is very important~"

Istero: [Okay, okay.]. "That. There's no application for the current technology regarding bacterial cellulose?"

Aus Betty Rui: [shakes index finger] "Not so, yo, bacterial cellulose is not only used as a textile material, but also as a medical material to make bandages, gauze and band-aids, which can effectively reduce the irritation of wounds, effectively relieve pain and speed up the healing process! And it also has applications in the food industry, due to the strong hydrophilicity, viscosity and stability of bacterial cellulose, can be used as a food forming agent, thickening agent, dispersing agent, anti-solubilizing agent, improve the taste as a sausage coat and the skeleton of certain foods, has become a new important food base and dietary fiber. Not to mention the use of bacterial cellulose in paper making and even sound…"

Istero [muttering in a small voice of annoyance]: how am I supposed to remember all this stuff? ...

Osbertiris [waving her hand to interrupt the complaining]: hold your horses, I've got some very important knowledge to tell you! [Pulled out a small writing pad from nowhere and made a gesture to lecture]

Istero: [holding his head up to the sky] I don't know how you get through every day in the lab.

Osbertiris [clears throat and chalks to the board]: where do all the masks

that are produced go after use. The first thing you need to know is that nowadays viruses are prevalent, not only in the medical and nursing staff, but also in the majority of people wearing masks that are medical masks, such as the packet of N95 masks on the table [pointing to the lab bench]. The discarded mask belongs to the medical waste "infectious waste", that is to say, carrying pathogenic microorganisms, with the risk of infectious disease transmission of medical waste, common as well as cotton balls, swabs, gauze, protective clothing and so on. Of course, the household masks we wear every day are not considered medical waste, and the masks worn by people in low-risk areas are not counted either, so they should only be disposed of according to the dry waste process.

Estero [yawns quietly, pen doesn't stop]: I see. Medical waste like this is treated separately from regular waste, and medical waste is only incinerated at a specific incineration plant, right [wink], how about it, I have some knowledge, sister~.

Osbertiris [laughs helplessly]: Yes, it is rare for you to have this kind of knowledge. It would be great if the great painter could share more of his street graffiti energy with his lab...

Istero [with an unconvinced face]: street graffiti is my true love, how can it compete with a boring experiment?

The first is a new type of mask that can be released to the market if it can be proven that the finished product is harmless to humans. Whether it's for medical or daily use, the results should be good.

Istero [sleepy eyes bright]: we only need to consider the issue of immature technology and cost reduction at the moment, otherwise even if it comes to the market, I'm afraid it can only be used for medical purposes, the public is unable to pay the high price, especially moonlighters like me who don't have the habit of saving money.

Osbertiris [white glance, but still nodded] let you usually do not develop the habit of [arm rest thinking] ah, right, there is a problem, the public has almost no concept of bacterial cellulose, let them accept such a new mask fear is also a problem.

Istero [repeat in a whisper, write it down in a notebook]: technology ..... cellulose cost ..... acceptability .....

Osbertiris: After all that, you should know something about it.

Istero: [nodding] Well, I've really learned a lot, it has so many advantages over other masks, let's just produce it and patent the whole thing, we'll be rich hahaha.

Osbertiris: Money money money money, are you dropping money sister [tapping sister], how can you think of money first if you want to think of what we can do for humanity by producing this? But then again, we're really trying to produce [Facial Pride]

Istero: [a little embarrassed] Well I know I'm wrong, so how do you produce it, it must be very complicated?

Osbertiris: Well indeed, because it involves not only the production of

bacterial cellulose, but also the improvement of its properties, and every step of the way is very complicated.

Istero: Tell me about it, I'm curious eh!

OSPETRIX: Okay, so I'll tell you about it. First, glucose is converted to 6-phospho-glucose by the action of glucokinase; then 6-phospho-glucose is converted to 1-phospho-glucose by the action of glucose isomerase; then 1-phospho-glucose forms uridine diphosphate glucose (UDPG) by the action of pyrophosphorylase; finally UDPG is catalyzed by cellulose synthase in the cell membrane and polymerizes Formation of β-1,4-glucoside chain, and then further polymerized into bacterial cellulose through graded assembly. After the formation of bacterial cellulose, we will improve their properties, for example, we will optimize the carbon source and nitrogen source, which are important components of the culture medium; and then we will improve the culture method and so on, which are all directly related to the yield.

Istero: Oh my God, this is so complicated! I'll just have to wish you luck. [Laughs sadly]

The next day

Mirakorum, the city that represents the "land of miracles", is actually the last attempt to save the planet's environment.

As the world's waste and destruction of environmental resources reaches a threshold that the planet can sustain, the ice caps at the North and South Poles are melting, and vast swathes of land are being swallowed up by the wildly rising sea levels. From occasional floods in the beginning to horrific tsunamis capable of destroying entire cities, natural disasters did not leave much time for mankind.

The countries that survived gathered together and held an emergency meeting. In response to the natural disaster that threatened the entire world, mankind chose to build a final fortress in Antarctica to develop technology that could combat the tragic future.

The name of this fortress was Mirakorum.

Most of the world's surviving research facilities have been moved to the underwater city at the South Pole, and underneath a glass dome, technology is being created that will reverse the [natural disaster]. At first, people believed that the city's name would bring about real change, but as time passed, the news from Mirakorum moved from the headlines to the corners of the newspapers - the hope for the "City of Miracles".... Fewer and fewer people believe that living in an underwater metropolis will protect them from natural disasters, so investing more money in research projects is clearly an unwise move. As the amount of money invested has dwindled, Mirakorum has gradually gone from being a popular destination to one of the hundreds of aquatic metropolises around the world. Gone is the aura of the past, and all that remains is the darkness that was hidden by the aura of the day.

- Mirakorum ML-J4 Residency Time: 7:00 a.m.

The sudden ringing of an alarm clock fills the small apartment room. The red-haired girl on the bed beside her opened her eyes in a daze as she sat up in bed and shot to the alarm clock that was still ringing on the bed.

"Sister... time to get up..." the red-haired girl didn't get a response, slowly waking up she remembered that her sister was sleeping on the bed in the other room. The girl was too lazy to knock on the door to wake up her sister, so she rushed to the bathroom to wash up, while struggling with her half-dressed jacket. After coming out of the bathroom, the girl grabbed a bag of bread from the table, carried a black backpack on the coat rack, put on her shoes and left the house.

It wasn't a long walk from the apartment to the lab, but the girl still walked quickly with her head down, as if she was avoiding something. There were very few people on the street in the morning, but those who saw the young girl were busy dodging as if they were hiding from something unclean.

"That monster is here again..."

"A friend of mine said that if you come in contact with [them], you will contract a terrible disease..."

As if she was used to hearing it, the young girl did not stop to refute the group of passersby who were chattering on the side, and instead chose to pick up her pace and continue walking towards the lab.

In a sense, those passersby were indeed right - the young girl's species was indeed not a purebred human, but a synthetic human that was created to speed up research. Rapidly advancing technology had made it possible to create bionic humans, and it was clearly more affordable to have bionic humans perform mass repetitive work than to have human scientists conduct research. However, due to the slow advancement of technology, even in the former City of Miracles, there was no way to make the Synthetics exist on the same scale as the regular human inhabitants, and it was even more difficult to get the public to accept the Synthetics inhabitants without prejudice. In recent years, thanks to the government's ever-increasing efforts to manage Synthetics-related crimes, the conditions for Synthetics' survival had only gotten much better.

It didn't take long for the front door of the lab to reveal itself to the young girl's - eyes. The holographic display board above the door read "Ritou Industrial LLC", which was much more prominent than the signs on the sides. The young woman's name was Osbertiris, and this unassuming laboratory was also a new energy development site of the Outdoors Heavy Industries. She took out her own identity card, and touched the sensor on the side; the blue holographic screen immediately displayed "Welcome back, director.

The lights in the corridor lit up one by one against the sound of Osbertiris' footsteps - each day she was the first one here, and likewise, the last one to leave. Again - opening the door to the locker room with her own authentication card, changing into her lab uniform, and putting on her safety glasses - the third airlock door finally opened slowly before her eyes. As she activated the various facilities in the lab, she casually picked up - a document on her desk and

reviewed it.

"On the possibility of using new microbial batteries..."

Microbial batteries - that's what this lab is currently working on. By centralizing the use of power-generating microorganisms and thus making small batteries that can be utilized in places where it is not possible to deploy generators - such as in remote rural areas.

"The degradation efficiency of... sugar transport into cells is significantly improved by adding signal peptides to endoglucanase and exoglucanase to break down cellulose extracellularly in the secretory tract and convert it to fibrous disaccharides, which are transported by transport proteins in the cell membrane of engineered bacteria to the Inside the engineered bacteria, it is then converted to glucose by beta glucosidase. The glucose will be used as fuel for the engineered bacteria, E. coli, allowing the E. coli to operate within the microbial fuel cell to generate electricity. In adding fuel, shredded cellulosic waste (e.g. waste paper) can be used as fuel for the fuel cell after the addition of organic solvents..."

She was tired of reading these instructions on basic theory, and the most important thing now was how to make the power generation unit as small as possible at a high enough output - to achieve a usable current, the equipment as it stood would require quite a few reaction chambers in series. Osbertiris sighed, put down the document in her hands, and turned to check on the cultivation of the engineered bacteria in the thermostat. A sudden shout from the doorway made her pause and turns her head to look at the figure in the doorway.

"Sister? Are you in there?"

Oh, so it's her sister, then it's not that big of a deal, she thought as she took a petri dish out of the thermostat and examined the plaque on it. Unlike her, her sister, Istero, was a proper natural. The reason why she became his sister in the first place was purely coincidental... she was looking for a part-time job at the time, and it so happened that the laboratories at Islands Heavy Industries were looking for volunteers who could test new synthetic humans. The test sample came to Istero.

But Istero was really able to change her mind and come up with all sorts of money-burning and time-consuming entertainment: game consoles, parkour, and graffiti... as if her entire being was made for extreme entertainment. Even with the two of them combined, they could barely cover an entire month's worth of expenses. With that in mind, Osbertiris redirected her attention to her work and continued to check the strains in the petri dish - after all, only hard work would yield enough funds to support the two of them.

"Sister, you're late again today!"