

## HKUST Research Team Invents World's Fastest Coronavirus Detection Device Offering Diagnostic Results in 40 Minutes

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Early detection of people infected of the novel Coronavirus has become an imminent challenge around the world as the epidemic continues to develop. A team of researchers from the Hong Kong University of Science and Technology (HKUST) recently invented the world's fastest portable COVID-2019 detection device. With the latest microfluidic chip technology, the device can detect the virus in just 40 minutes from sampling to testing, compared to the currently-used polymerase chain reaction (PCR) technology which takes between 1.5 to 3 hours.

PCR technology is a molecular biotechnology used to amplify specific DNA fragments for the extraction of viral RNA, and the speed of temperature change is the key that determines the efficiency of the DNA's amplification process, meaning the faster the temperature rises, the shorter the device can come up with a test result.

Unlike conventional large-scale PCR devices which use semiconductor to heat up testing samples, the team led by Prof. WEN Weijia from HKUST's Department of Physics developed a novel silicon-based micro-heater module for the purpose. The micro-heater, which has lower thermal mass and a better thermal conductivity, could speed up temperature rises to around 30°C per second from an average of 4-5°C per second in conventional PCR devices, greatly reducing the detection time.

Leveraging on Shenzhen Shineway Technology – a biotechnology startup company co-founded by Prof. Wen and his doctoral graduate Dr. GAO Yibo, the team started this research immediately after obtaining the new coronavirus sequence on January 20 and came up with the testing kit within a week. The new device is already in use by the Centers for Disease Control and Prevention (CDCP) in Shenzhen and Guangzhou, while two more sets were being delivered to the CDCP in Hubei and Nansha. The device has obtained international CE certification (EU standard) and is qualified for export to all European Union (EU) countries as well as Hong Kong.

The detection device uses standard rapid testing tools such as those used for influenza: a quick screen is used to take a sample of the nasal cavity, which is then put into the analyzer to determine the result. Measuring just 33cm long, 32cm wide and 16cm high, the equipment set is light and portable, which is suitable for rapid on-site testing in places such as centers for disease control and prevention, customs, entry-exit inspection and quarantine departments, as well as nursing homes for the elderly. Each device is equipped with a microfluidic portable PCR analyzer, a pre-processing instrument, a bioassay chip and the novel coronavirus nucleic acid detection kits. It can test up to 8 samples simultaneously.

Shineway Technology is a technology company focuses on the development of real-time in vitro diagnosis technology of nucleic acid molecules, its core team members are all researchers or graduates of HKUST.

**Operation video of the microfluidic biochip detection device:**

<https://drive.google.com/open?id=1RQayd3FNelQEBkrBs7OWB0-Tzb9gm8rn>

**About The Hong Kong University of Science and Technology**

The Hong Kong University of Science and Technology (HKUST) ([www.ust.hk](http://www.ust.hk)) is a world-class research university that focuses on science, technology and business as well as humanities and social science. HKUST offers an international campus, and a holistic and interdisciplinary pedagogy to nurture well-rounded graduates with global vision, a strong entrepreneurial spirit and innovative thinking. HKUST attained the highest proportion of internationally excellent research work in the Research Assessment Exercise 2014 of Hong Kong's University Grants Committee, and is ranked as the world's best young university in Times Higher Education's Young University Rankings 2019. Its graduates were ranked 10th worldwide and top in Greater China in Global Employability University Survey 2019.

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Prof. WEN Weijia

现场快速分子诊断移动箱	产品系列			
	 Type1(Portable)	 Type2 (IVD)	 微流控PCR芯片	 微流控PCR试剂
	核酸扩增检测分析仪			
-核酸扩增检测分析仪主要由控制系统（触摸屏人机界面）、电源系统、光电系统、温控系统、外壳部件、软件模块等组成。		-PCR反应载体： -腔室体积：2μl	-核酸扩增反应组分： -规格：24T/盒	

The new microfluidic biochip detection device, invented by Prof. Wen and his team, can detect the novel Coronavirus in just 40 minutes from sampling to testing.



PCR Nucleic Acid Analyzer



Microfluidic PCR Chip



Microfluidic PCR Reagents



Prof. Wen (Middle) and Dr. Gao (right) introduce the theories behind their novel detection device in their research base at Shenzhen.

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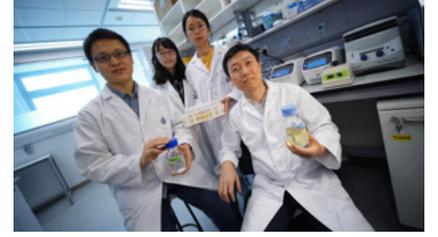
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