



# Corona virus RNA-dependent RNA polymerase inhibitor cell-based high-efficiency screening system

A cell-based high throughput screening system for inhibitor of coronavirus RNA-dependent RNA polymerase



**Patent title** Corona virus infection treatment agent screening system

**Inventor** Korea Institute of Oriental Medicine / Kwon Seon-oh

**Patent application No.** KR 10-2020-0120802

**Authority status** Filed

## Technicality

### Technology overview

- A system technology in which a human kidney-derived HEK293T cell line is transfected with a Corona virus RNA-dependent RNA polymerase expression vector and a luciferase\* reporter vector, and then the expression amount of luciferase of reporter RNA synthesized by a Corona virus polymerase expressed in cells is quantitatively measured, so that high-efficiency screening of coronavirus polymerase inhibitor candidates is possible.

\* An enzyme involved in the production of light by organisms (luciferase)

### Development background and problem to be solved

- It is necessary to secure a high-efficiency candidate material screening system for the development of therapeutic agents for new or mutated virus infection.
- Corona virus RNA polymerase is a key target for antiviral drug development (for example: Remdesivir).
- An existing method for measuring the activity of Corona virus polymerase requires large quantities of high-purity proteins with high activities.
- In addition, it is difficult to establish and maintain polymerase reaction conditions (reaction buffer, temperature, reaction time, and the like).
- Safety facilities for handling isotopes are required to check polymerase activities.

### Excellence and discrimination of technology

#### Excellence of technology

- A new drug development platform can be utilized through high-efficiency screening of antiviral drug candidates on the basis of the Corona virus polymerase target.
- When a variety of new and mutated viruses emerge, the technology can be applied as a customized screening kit for new drug candidates customized for results of gene sequence analyses.

#### Discrimination of technology

- An antiviral agent screening system under conditions similar to an actual viral gene replication environment which analyzes the activity of viral polymerase expressed in living cells
- It is very easy to obtain screening results by a luciferase quantitative analysis (no isotopes required).
- High throughput screening (HTS) can be applied to enable high-efficiency screening of a large quantity of test substances.



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## Implementation method

- The technology includes a coronavirus polymerase expression vector and a luciferase expression reporter vector.
- Vectors are transfected into an HEK293T cell line in a 96well plate, and the inhibition of the luciferase activity of reporter RNA by a test substance is measured in a luminescence analyzer.

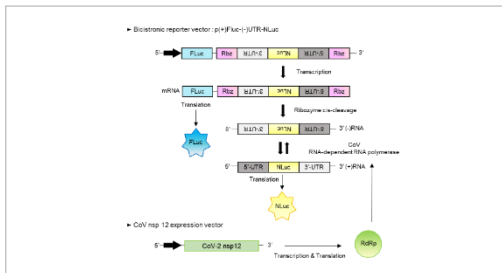


Figure 1 Conceptual diagram of an operation of this technology

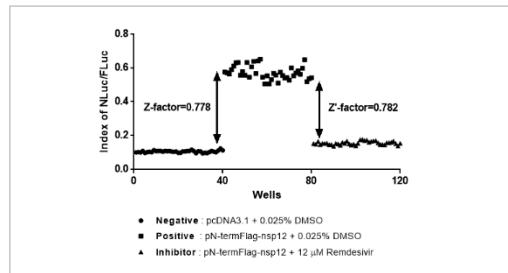


Figure 2 Reliability test result

## Degree of technology completion (TRL)

Degree of technology completion: TRL4 (Lab Scale prototype development stage)

TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9
Technical principle presentation	Technology concept setting	Technology concept verification	Lab Scale prototype development	Implementation environment application experiment	Full Scale prototype development	Quasi-commercial product development	Commercial product development	Commercial product implementation

## Utilization

### Utilization field and applied product

#### Utilization field

- New drug development and virology research field



Figure 1 Analysis kit example 1  
<Data: MULTI SCIENCES>

#### Applied product

- Customized polymerase activity assay kit



Figure 2 Analysis kit example 2  
<Data: Zika Virus Antibody, Alibaba>



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## Technology trend

- A current Corona virus RNA polymerase activity measurement technology uses a method of confirming an RNA product, which is synthesized by a recombinant protein, by using a radioisotope by electrophoresis the RNA product on an agarose gel.
- There is no cell-based automated high-efficiency screening technology for discovering candidate substances for Corona virus RNA polymerase activity inhibition.
- There is a case in which BPS Bioscience in the US has released a 3CL protease assay kit and a Papain-like protease assay kit using 3CL and PL protease recombinant proteins among Corona virus proteins.
- However, there is no case of releasing a kit for measuring the activity of Corona virus RNA polymerase worldwide.

## Family patent status

Application nation	Application No. (Application date) / Registration No.	Title of the invention
KOR	KR 10-2020-0120802 / -	Corona virus infection treatment agent screening system
KOR	PCT/KR2020/013330 / -	Corona virus infection treatment agent screening system

## Market prospect

### Target market size and prospect

- The overseas in vitro diagnostic device market is expected to grow at a CAGR of 4.2%, from USD 47.458 billion in 2015 to approximately USD 71.397 billion in 2025.
- The domestic in vitro diagnostic device market is expected to grow at a CAGR of 2.9%, from USD 574 million in 2015 to USD 762 million in 2025.

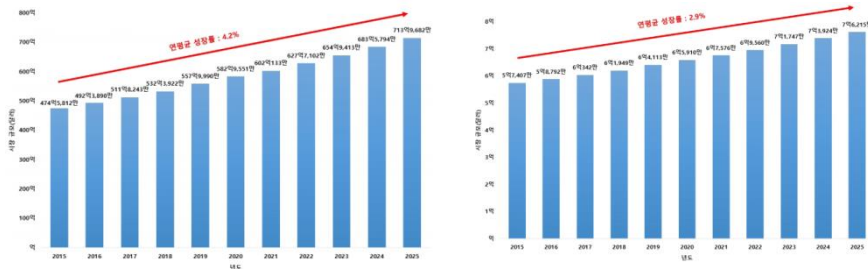


Table Global in vitro diagnostic device market size (left) / Domestic in vitro diagnostic device market size (right) [dollar]

<Data: Convergence Research Policy Center, Convergence FOCUS >

## Technology transfer query

## Technology transfer process

**Person in charge** Kyuhyeong LIM

**Contact** 070-4333-8021

**Email** khlim@doohopat.co.kr

**DH** 두호특허법인 / (주) 두호기술경영  
DooHo IP Law Firm / DooHo Tech. & Mgt. Inc.

Explore promising technologies → Contract consultation → Apply for technology transfer → Negotiate and sign contracts → Follow-up support