

**LAMP Kit for detecting *2019 Novel Coronavirus*  
(*COVID-19*)**

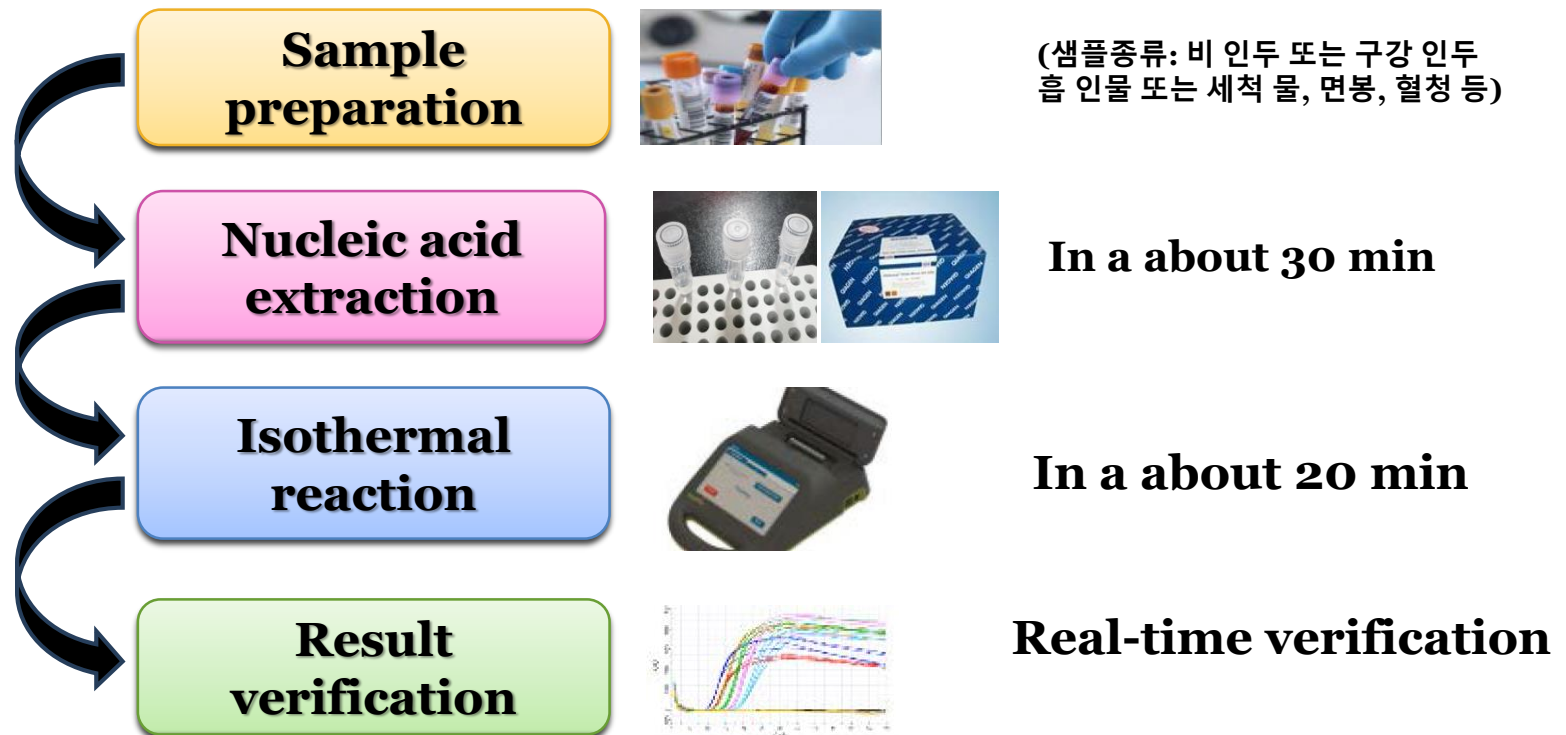
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Armed Forces Medical Research Institute,  
South Korea**

## ▶ LAMP procedure

샘플채취 -> 핵산추출 -> 등온반응 -> 결과확인

전처리단계  
(약 30분 소요, 동일함)

분석 및 결과확인 단계  
(약 20분 소요)



## ► Protocol (simple)

핵산(RNA) 2ul + LAMP 시약 → 결과확인

핵산(RNA) 준비

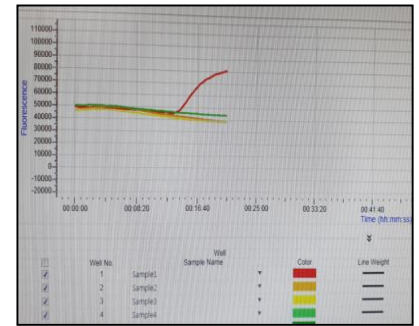
핵산(RNA) 2ul를 LAMP 시약과 혼합



**Extracted RNA (2 ul)  
adds to LAMP Premix**

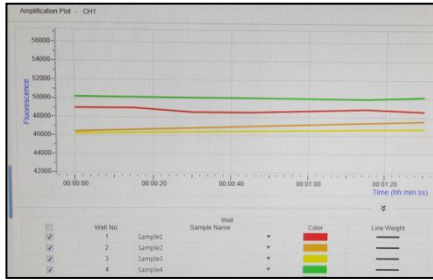


**RNA-included LAMP Premix  
inserts to the Block of LAMP Device**



**Monitoring Real-time  
LAMP Reaction**

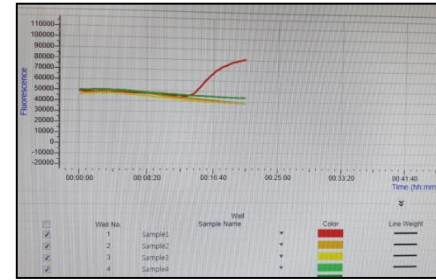
# ► Real-time LAMP Monitoring (실시간 등온증폭 모습)



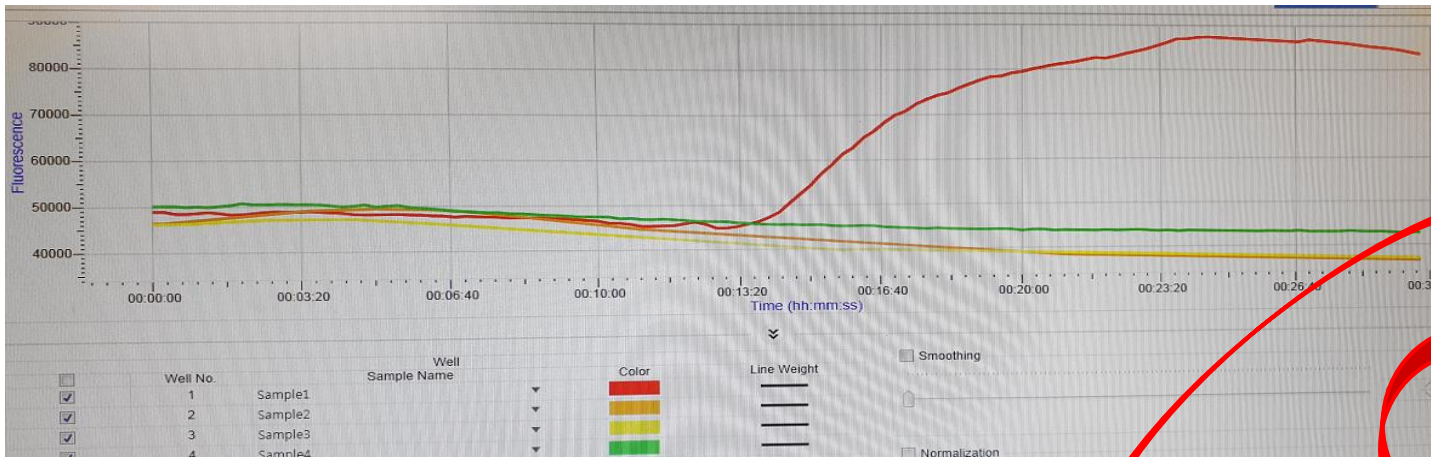
1. Check the fluorescence of each sample



2. Checked Amplified Peak



3. Checked Saturated Peak



4. Checked Final Peak

Results	Amplification
Positive	00:13:45

In about 14min, COVID-19 Diagnosis is possible

No.	Color	Sample Name	Results	Amplification	Peak Value (°C)
1	Red	Sample1	Positive	00:13:45	---
2	Orange	Sample2	---	---	---
3	Yellow	Sample3	---	---	---
4	Green	Sample4	---	---	---

5. Verified Positive or Negative Result through Cut-off value

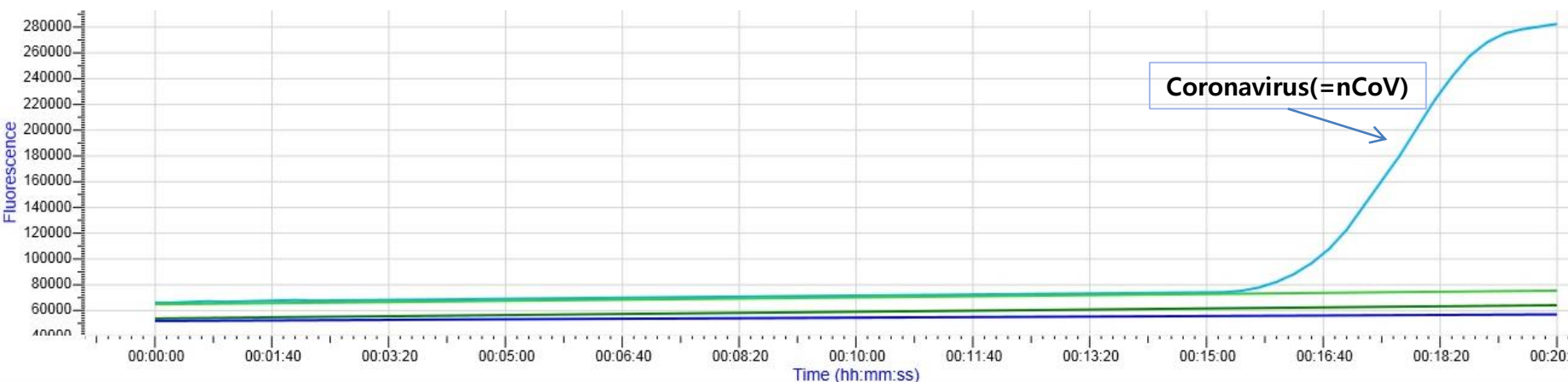
By Real-time PCR, COVID-19 Diagnosis takes about 2 hours

# ▶ Portable Real-time Isothermal Device 적용 (분석시간)



Run method : **70℃ 20 min**

장비 : Portable Real-time Isothermal Device (Allsheung Company, China)



\* In **10 repeated experiments**, we obtained similar results

[nCoV : 2019 Novel Coronavirus (COVID-19) Clinical sample,  
HI : Haemophilus influenzae Clinical sample,  
SP : Streptococcus pneumoniae Clinical sample,  
MP : Mycoplasma pneumoniae Clinical sample]

	Well			
	Well No.	Sample Name		Color
<input type="checkbox"/>	1	-	▼	Red
<input type="checkbox"/>	2	-	▼	Orange
<input checked="" type="checkbox"/>	3	nCoV	▼	Blue
<input checked="" type="checkbox"/>	4	HI	▼	Green
<input checked="" type="checkbox"/>	5	SP	▼	Dark Green
<input checked="" type="checkbox"/>	6	MP	▼	Dark Blue
<input type="checkbox"/>	7	-	▼	Dark Purple
<input type="checkbox"/>	8	-	▼	Pink

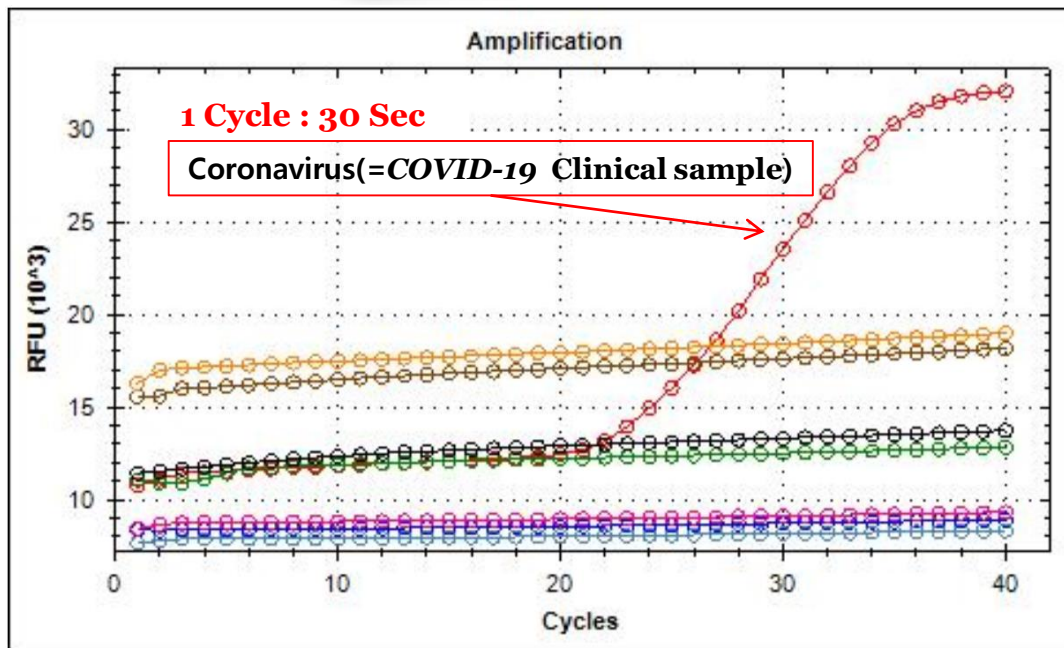
[In a about **16 min**, **COVID-19 Clinical sample** was specifically detected)

# ▶ BioRad CFX 96 Real-time PCR Device 적용 (분석시간)



Run method : **22 min(40 cycles)**

장비 : BioRad CFX 96 Real-time PCR



- COVID-19 Clinical sample
- Adenovirus type 55
- H. Influenzae (인플루엔자)
- S. Pneumoniae (폐렴균)
- M. Pneumoniae (폐렴균)
- SFTS Virus (중증열성혈소판감소증후군)
- Malaria
- Scrub. Typhus(쯔쯔가무시병)

[In a about 22 cycles (**11 min**), COVID-19 Clinical sample was specifically detected)

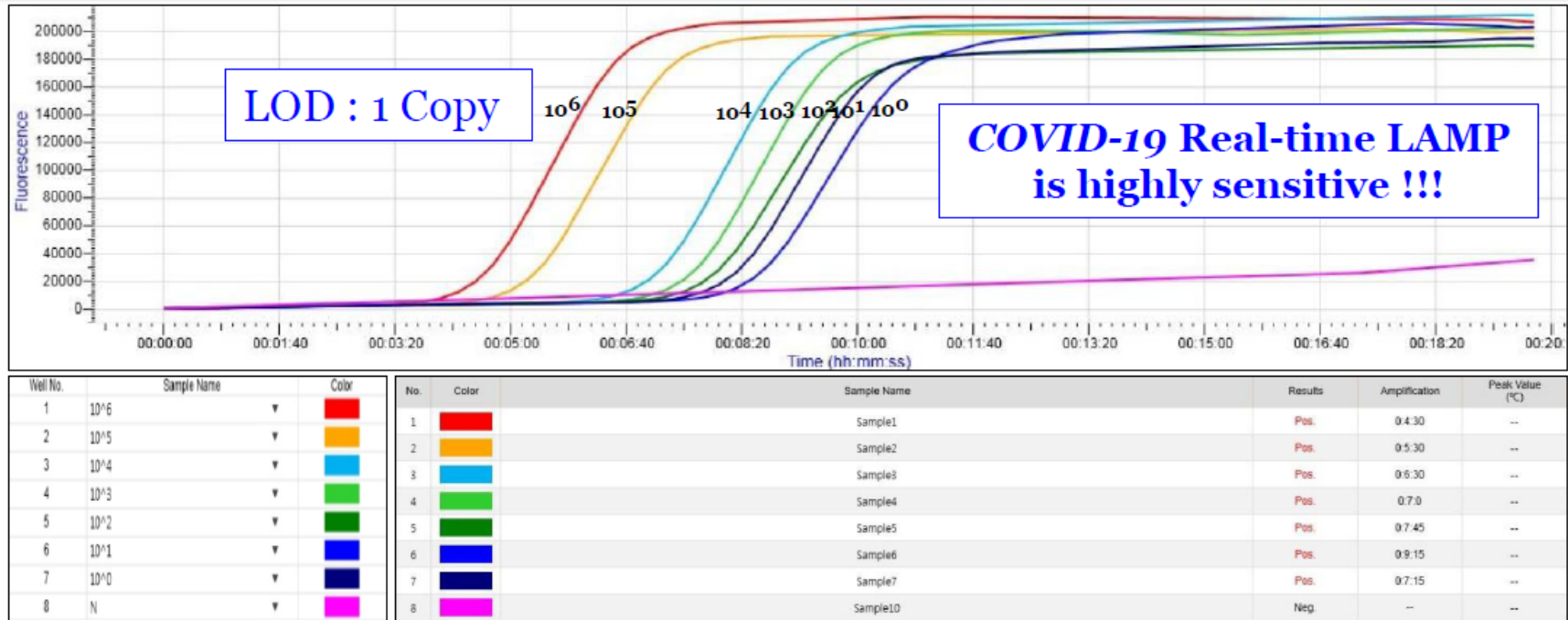




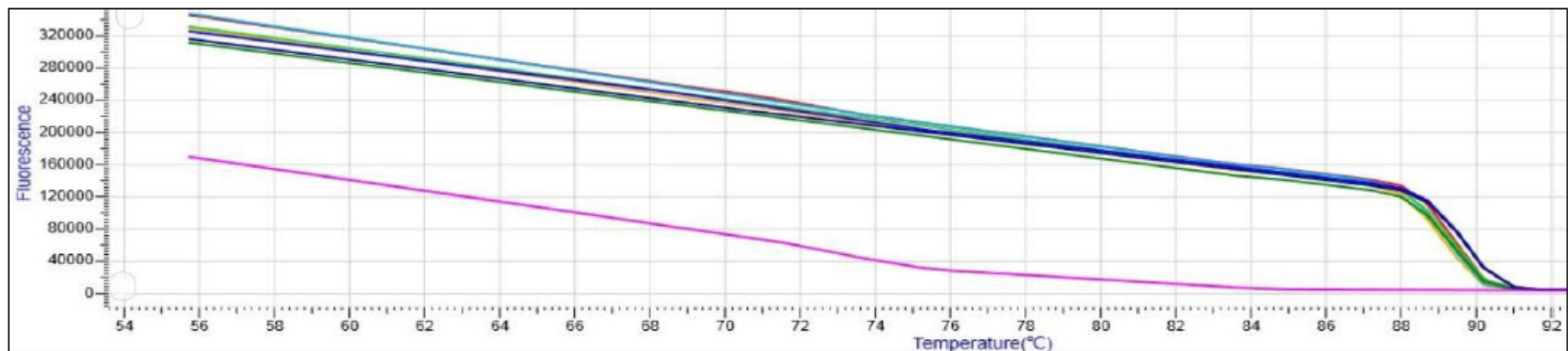
# ▶ LOD (Limit of detection) of *COVID-19* Real-time LAMP Result

(Using Allsheung Portable Real-time Isothermal Device)

최소검출한계 : 1 copy( $10^0$ )



The LOD of *COVID-19* Real-time LAMP kit is determined as 1 copy.  
[Until 15 min, we can observe the saturated curve even in 1 copy]

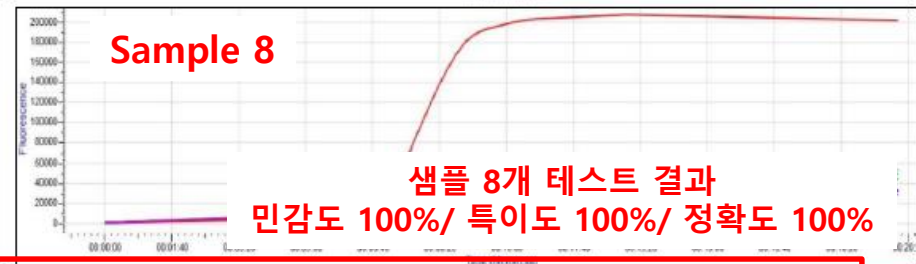
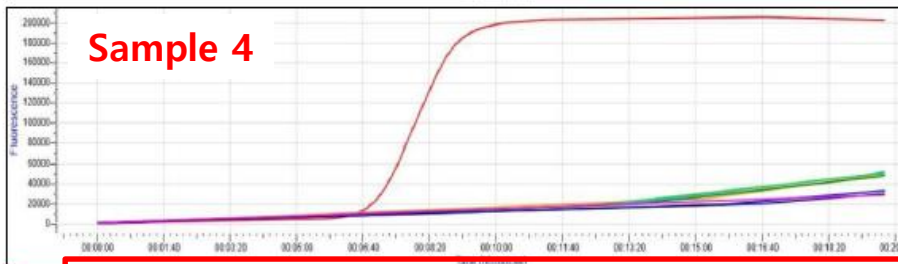
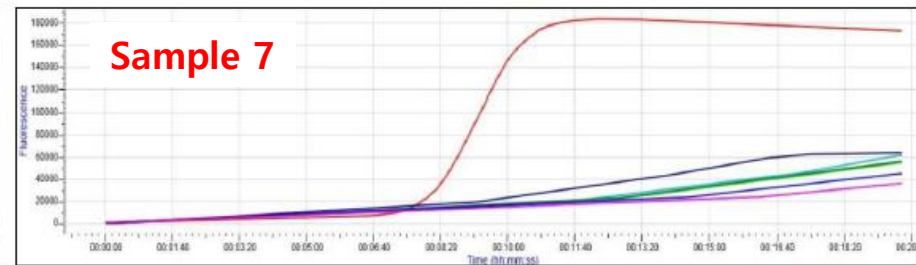
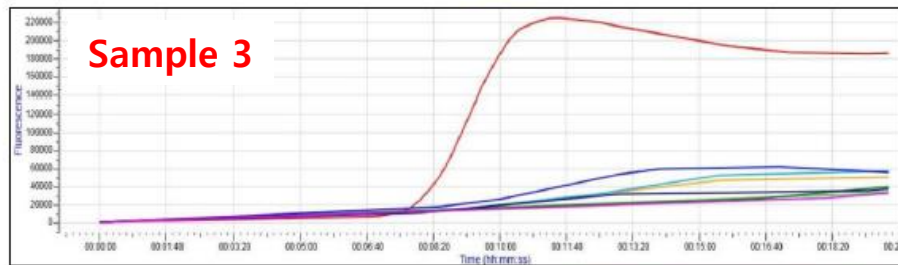
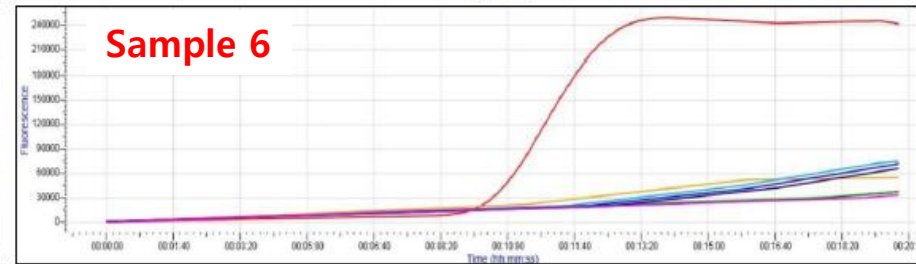
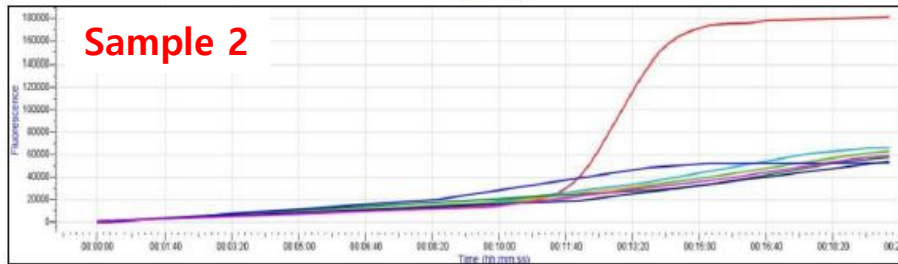
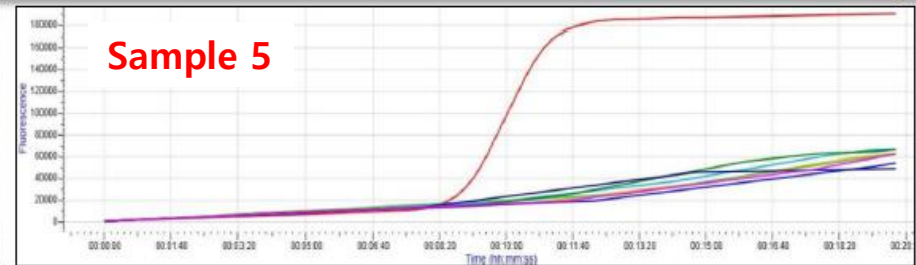
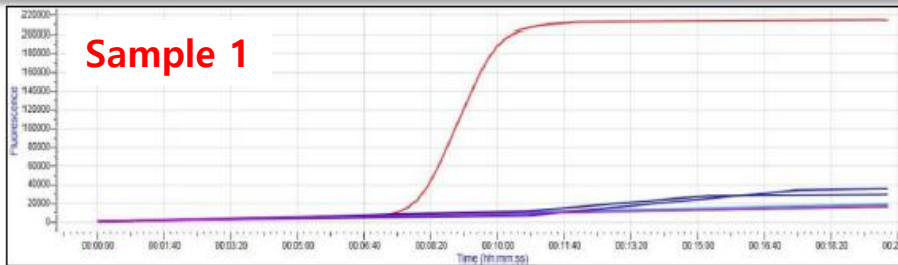


In *COVID-19* Real-time LAMP Melting curve, we can detect the specific melting curves of all copies.



# ► Performance of COVID-19 Real-time LAMP

(Using Allsheung Portable Real-time Isothermal Device)



샘플 8개 테스트 결과  
민감도 100%/ 특이도 100%/ 정확도 100%

**Sensitivity : 8/8 (100%), Specificity : 56/56 (100%), Accuracy : 64/64 (100%)**

**In addition to higher sensitivity, COVID-19 Real-time LAMP exhibited a higher discriminate power than Real-time PCR, as proved by AFMRI of ROK**



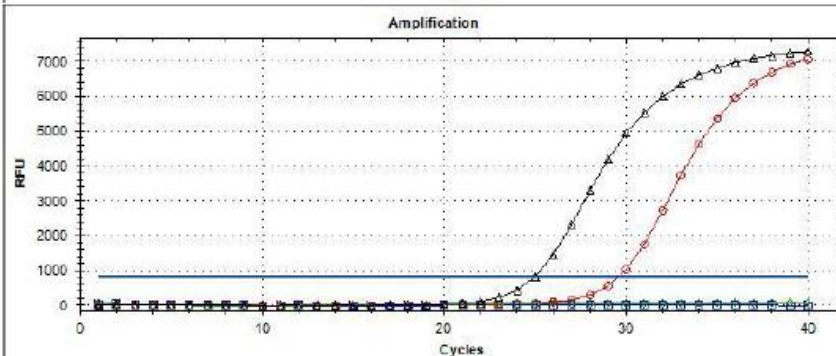
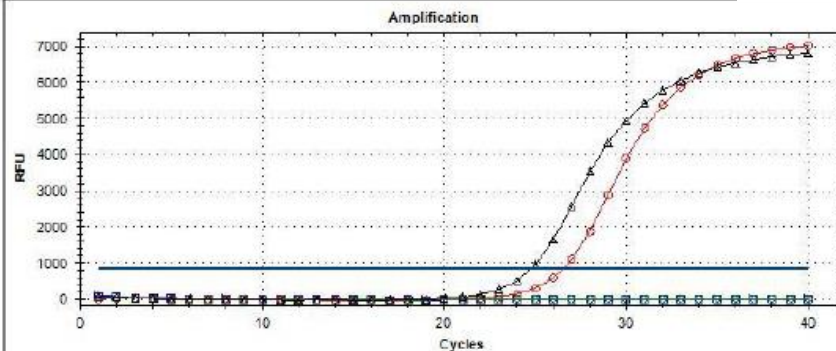
# ▶ **Comparative experiment** (COVID-19 Real-time LAMP VS COGENE)

\*분석시간 단축  
코젠바이오텍 vs 국군의학연구소  
(2hr) (20min)



**COGENE**  
**E gene**  
Korea Emergency  
Approval Kit

**COGENE**  
**RdRp gene**  
Korea Emergency  
Approval Kit



○ RNA (Ct: 26.5)  
△ Positive control (Ct: 24.7)

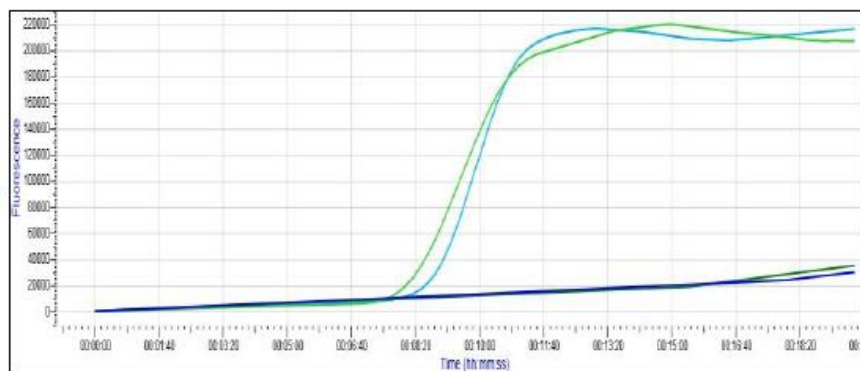
□ Negative 1  
◇ Negative 2

○ RNA (Ct: 29.6)  
△ Positive control (Ct: 25)

□ Negative 1  
◇ Negative 2

**Cogene kit takes about 2 hours against Clinical sample.**

**COVID-19**  
**Real-time LAMP**



RNA (8 Min)(감염샘플)  
Positive control (8 Min)  
(양성샘플)

Negative 1  
Negative 2 (음성샘플)

**COVID-19 Real-time LAMP takes about 8 min against same clinical sample.**