

# Mini-Disk Capillary Array Coupling with LAMP for Visual Detection of Multiple Nucleic Acids

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Marleen Voorhuijzen

Dr. Mariel Pikkemaat

Dr. Martijn Staats

Dr. Cor Schoen

*Wageningen University and Research*

Dr. Litao Yang

Dr. Rong Li

*Shanghai Jiao Tong University*





# Fast DNA/RNA diagnostics





# Features fast DNA/RNA diagnostics

On-site → outside a sophisticated lab



Applicable by non-lab-trained employees



Short reaction time and multiplexing



Clear read out of test signals



Easy processing and forwarding of results

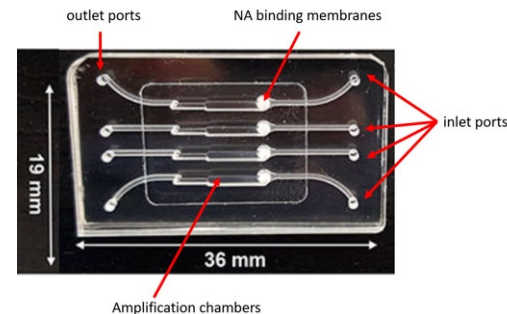




# LAMP

## Loop-mediated **amplification**

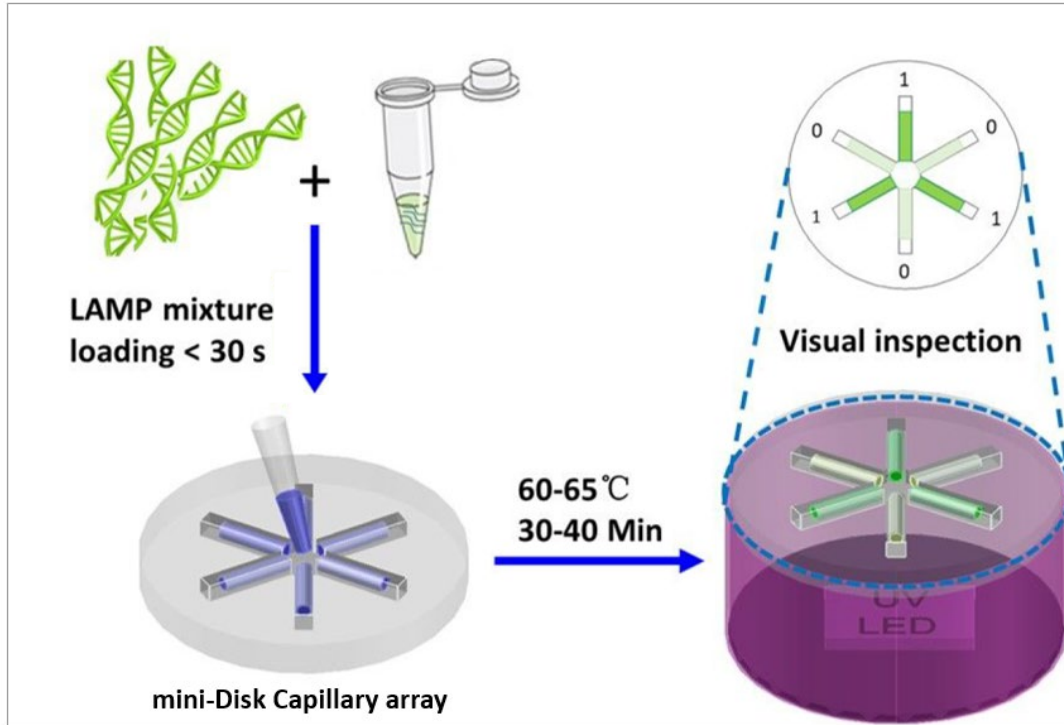
- Short reaction time (<30 minutes)
- Sensitivity and specificity similar to lab-based methods
- No temperature cycles = simple equipment
- Tolerance for inhibitors = crude extraction methods



*microfluidics*

# mDC-LAMP array

## mini-Disk Capillary-LAMP Array



coin size





# Applicability mDC-Array on-site

Crude DNA extraction



KOH

filter separation

Zhang et al., 2013



coin size

Amplification @ 60-65°C



vehicle heating cup

Detection

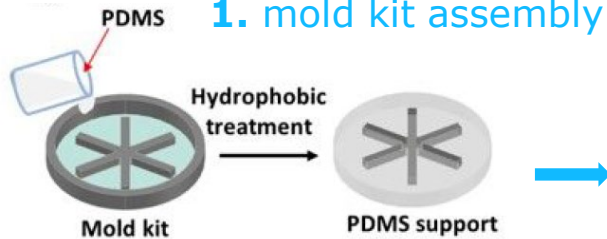


hand-held UV flashlight

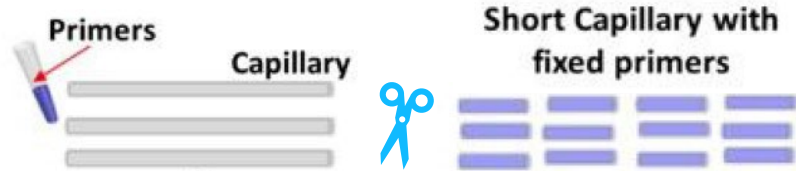


# mDC-LAMP preparation

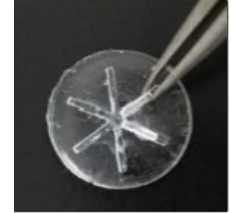
## 1. mold kit assembly



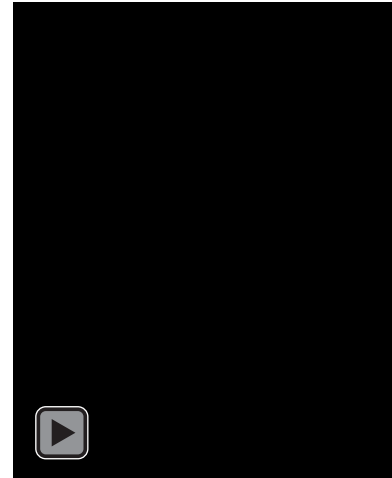
## 2. capillary preparation



## 3. array production



mDC-LAMP array  
loading





# Targets



## GMOs

## Plant pathogens

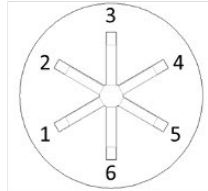




# mDC-LAMP for GMO: specificity

a

Layout



No.	Target
1	P-CaMV35S
2	P-FMV35S
3	pat
4	NPT II
5	ADH1
6	none

b

MON863



1,4,5

c

MON89034



1,2,5

d

59122



1,3,5

e

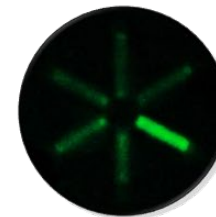
GMO mix



1,2,3,4,5

f

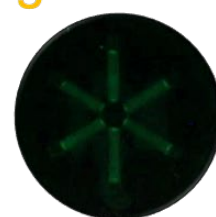
Non-GM Maize



5

g

NTC

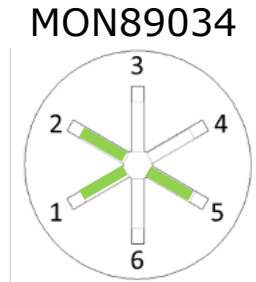


None



# mDC-LAMP for GMO: sensitivity

No.	Target
1	P-CaMV35S
2	P-FMV35S
3	pat
4	NPT II
5	ADH1
6	none



a



**50**  
copies/well

b



**25**  
copies/well

c



**10**  
copies/well

d



**5**  
copies/well

e



**0**  
copies/well

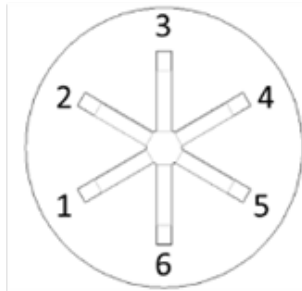


**LOD: 25 copies per capillary**

# mDC-LAMP for plant pathogen: targets

Tomato brown rugose fruit virus ( <b>ToBRFV</b> )	plant virus hosting in tomato/peppers
Clavibacter michiganensis ( <b>Cmm</b> )	plant pathogenic actinomycete
Acidovorax citrulli ( <b>Aac</b> )	bacterium causing seedling blight and fruit blotch
Cyclooxygenase in tomato ( <b>cox</b> )	housekeeping gene tomato

Layout



No. Target

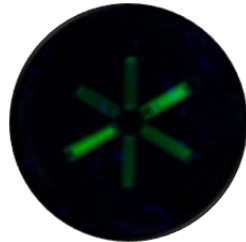
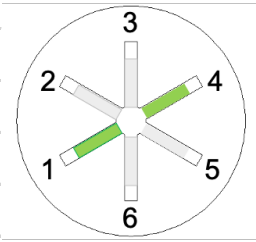
1	Aac
2	cmm
3	ToBRFV
4	cox
5	none
6	none



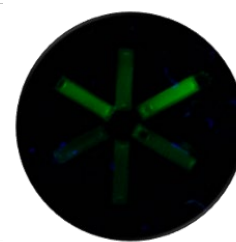
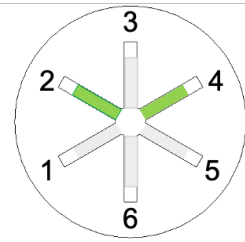


# mDC-LAMP for plant pathogen: results

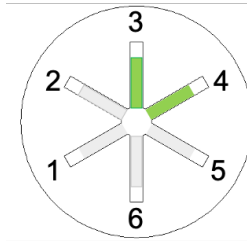
No.	Target
1	Aac
2	cmm
3	ToBRFV
4	cox
5	none
6	none



tomato + Aac

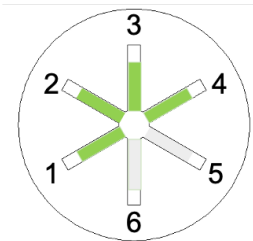


tomato + cmm



tomato + ToBRFV

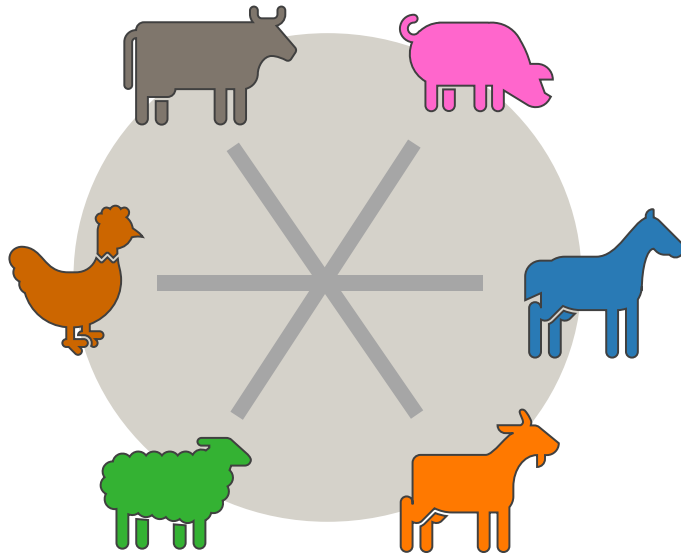
Crude infected  
leaf extracts



tomato + Aac  
+ cmm  
+ ToBRFV

# mDC-LAMP@Wageningen Food Safety Research

## Animal species



## Allergens





# End slide or section heading

Text

