Supporting Information

Fully automated chemiluminescence microarray analysis platform for rapid and multiplexed SARS-CoV-2 serodiagnostics

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Table S1. Main assay steps on the MCR-R (steps that only apply to the sequential IgM/IgG detection are shown in italic)

Step	**Volume**	**Flow rate**	**Comment**
Sample injection	40 µL	-	done manually
Sample incubation			*60 s*
Flushing of chip	*2000 µL*	*500 µL s^{-1}*	
IgM detection antibody injection	*800 µL*	*10 µL s^{-1}*	
Flushing of chip	*2000 µL*	*500 µL s^{-1}*	
CL reagents injection	*400 µL*	*150 µL s^{-1}*	
Image acquisition	-	-	*60 s exposure*
Flushing of whole fluidic system	*7500 µL*	*500 µL s^{-1}*	
Flushing of chip	2000 µL	500 µL s^{-1}	
IgG detection antibody injection	800 µL	10 µL s^{-1}	
Flushing of chip	2000 µL	500 µL s^{-1}	
CL reagents injection	400 µL	150 µL s^{-1}	
Image acquisition	-	-	60 s exposure
Flushing of whole fluidic system	7500 µL	500 µL s^{-1}	

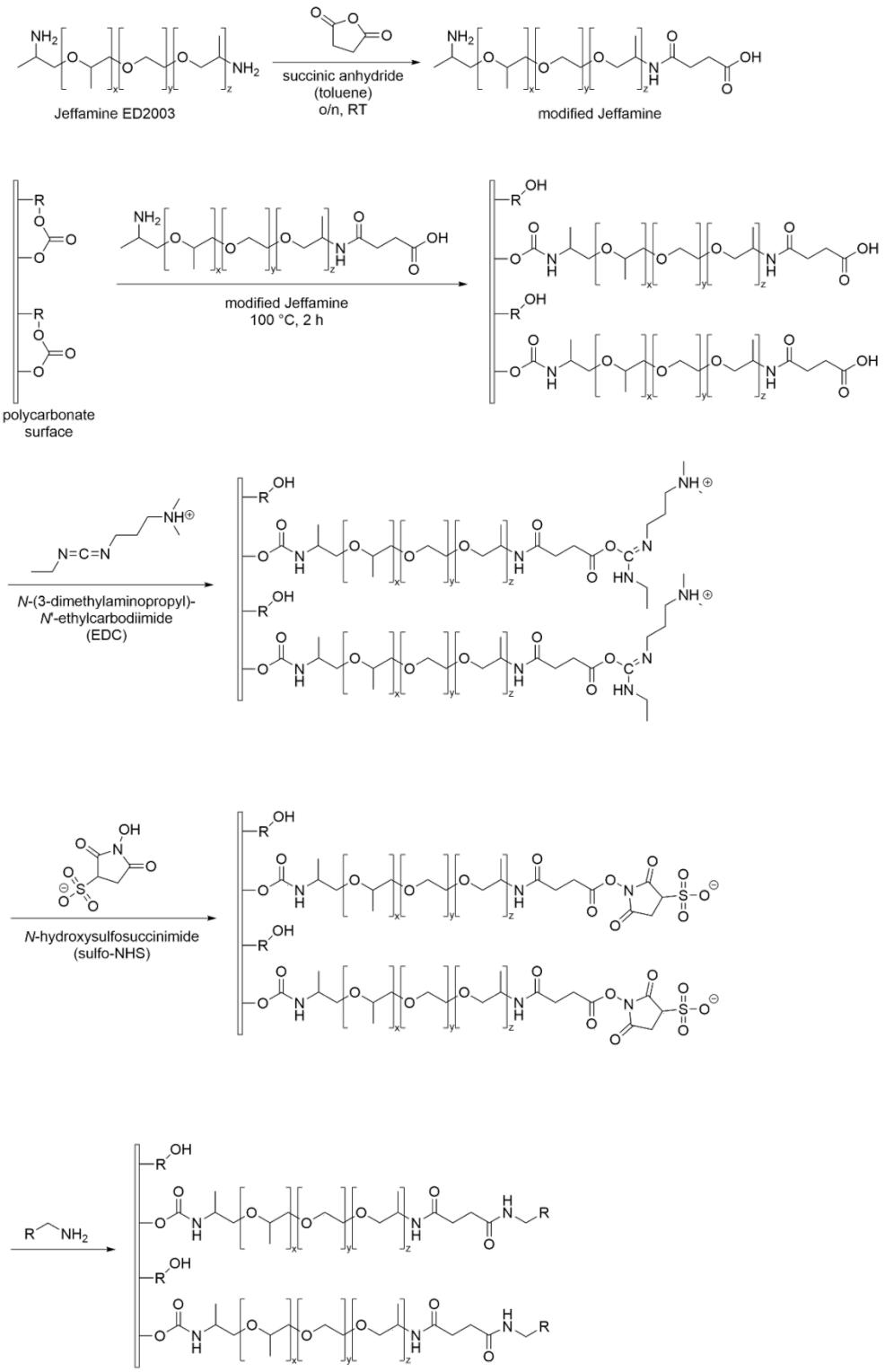

Figure S1: Reaction scheme of surface modification and covalent protein immobilization on polycarbonate surfaces

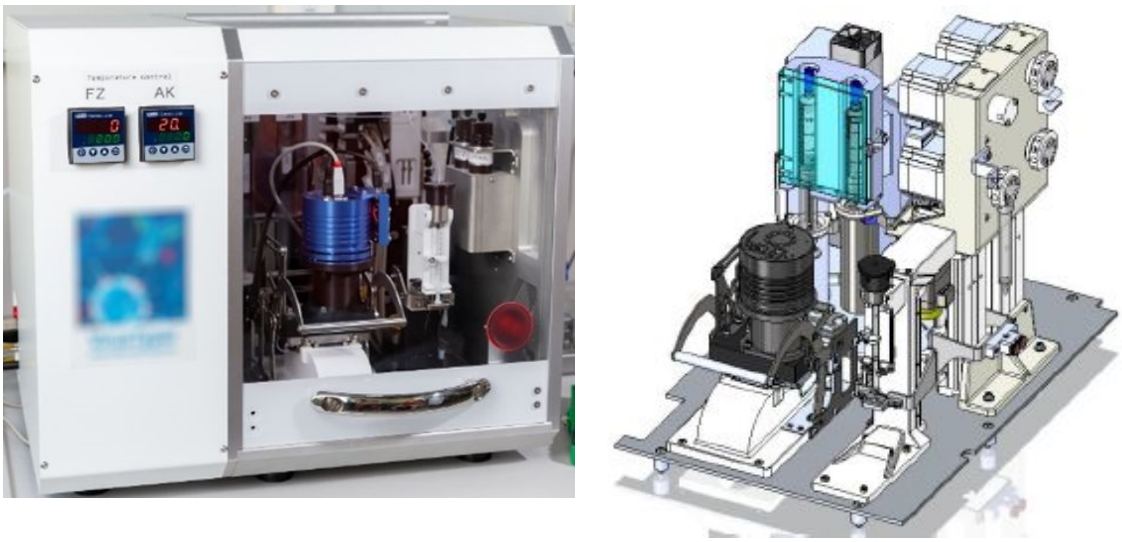

Figure S2: Automated microarray platform MCR-R; left: physical image of the device, right: schematic depiction of the main device elements: camera unit, syringe pumps and valves (copyright of right image: GWK Präzisionstechnik GmbH)

Description of the MCR-R:

The MCR-R was developed by the Chair of Analytical Chemistry (TUM) together with GWK Präzisionstechnik GmbH (Munich). It is the currently newest generation of Microarray Chip Readers (MCR) and offers versatile application possibilities for both research and routine application. Its main components are a CCD camera locate above a microarray chip loading unit (shown in black in the front left of Figure S2 (right image). Behind the camera unit, two syringes for the dosage of peroxidase labelled detection antibodies are located, on the right of the camera unit a syringe pump for sample injection can be found. Behind this syringe pumps, the valve tower is seen, containing four valves and a syringe pump for the transport of chemiluminescence reagents, running buffer and cleaning reagents. With its size of 50 x 50 cm, the device is suitable for benchtop placing, a recently presented version of the MCR-R is even smaller than the one used in this manuscript while having the same functionality.

For the application in research, the device offers a software toolbox allowing for the design of different measurement programs, e.g. for sequential programs using two different detection antibodies, programs with syringe injection of the sample or direct sample injection into the microarray chip and many more options, allowing for the development of optimized assays for the applications of interest.

For routine application of the device, only the necessary measurement programs are activated and can then be used by any user who had a short training on the device, even without a deeper technical or chemistry background. Only few manual steps (filling reagent syringes and containers, starting the measurement program, entering a microarray chip) have to be done, while the whole assay is done completely automatically. The data evaluation software is tailormade for every application so that all relevant evaluation steps are done on the device for routine applications. Therefore, the device is suitable for point-of-care applications as it is easy to use, shows a high degree of automation, is small enough to find space in hospitals or medical practices and can be used for various different microarray applications with relevance at the point of care.

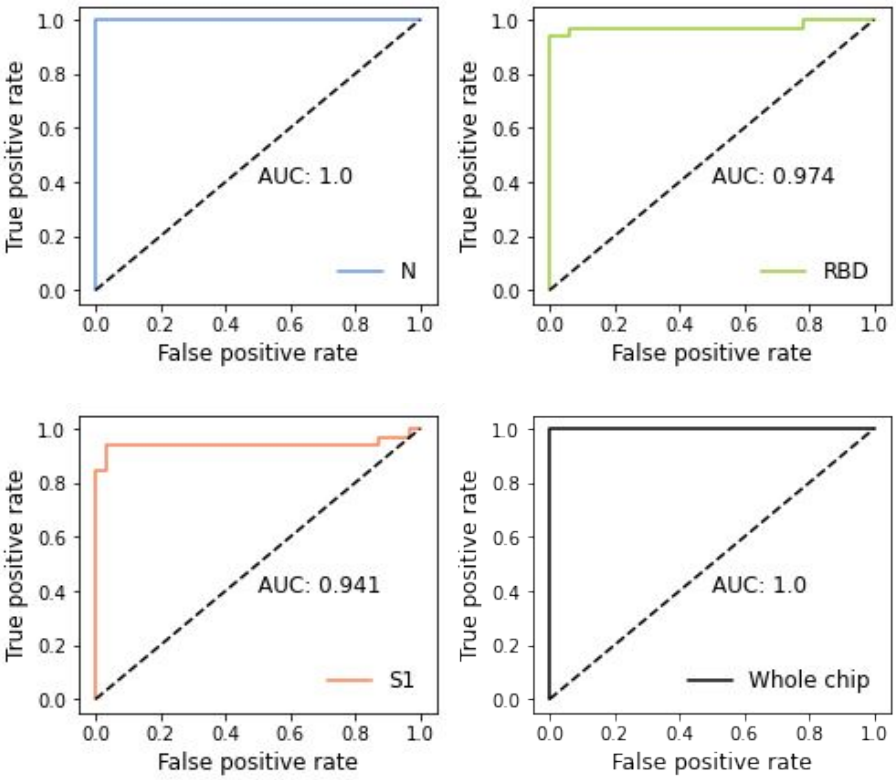

Figure S3: ROC curves obtained for N protein, RBD, S1 protein and combined ROC curve for the whole microarray chip