Resistance measurements

The data logger supplies a steady voltage of 2.5 V (V_{EX}). This voltage is distributed between the reference resistor (R_{ref}), which has a known and constant resistance, and the IDA-CR whose resistance is changing according to the detected analyte concentration. The voltage is relatively distributed according to the resistance of the two circuit components. Therefore, given the voltage between V_{EX} and ground (GND), the voltage between V_{meas} and GND is measurable, and from their ratio it is possible to calculate IDA-CR resistance (eq. 1).

$$\frac{V_{meas}}{V_{EX}} = \frac{R_{CR}}{R_{CR} + R_{ref}} \quad \rightarrow R_{CR} = \frac{R_{ref} \cdot (\frac{V_{meas}}{V_{EX}})}{1 - (\frac{V_{meas}}{V_{EX}})} \qquad \text{(eq. 1)}$$

CRBasic software is used for communication. The data management is carried out with a program written using Visual Basic software.

Δ of the resistance IDA-CR, due to exposure and removal of linalool, was calculated according to equation 2.

Δ (% R Change) = (ΔR/R_initial ·100) % (eq.2)

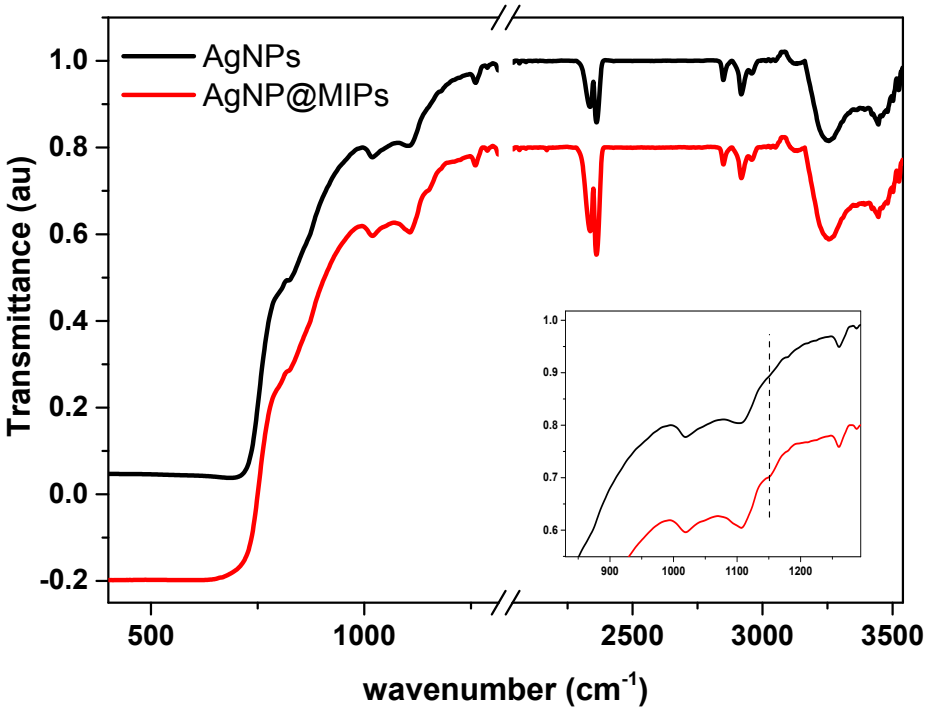

Figure S1. FTIR transmittance spectra of AgNPs and AgNP@MIPs. Insert: zoom of 850-1300 cm^{-1}. Water area is excluded.

Most of the AgNPs and AgNP@MIPs spectra are identical except of an additional shoulder, which appears in AgNP@MIPs spectrum at 1153 cm^{-1} and can be attributed to C-O-C vibrations of EGDMA.

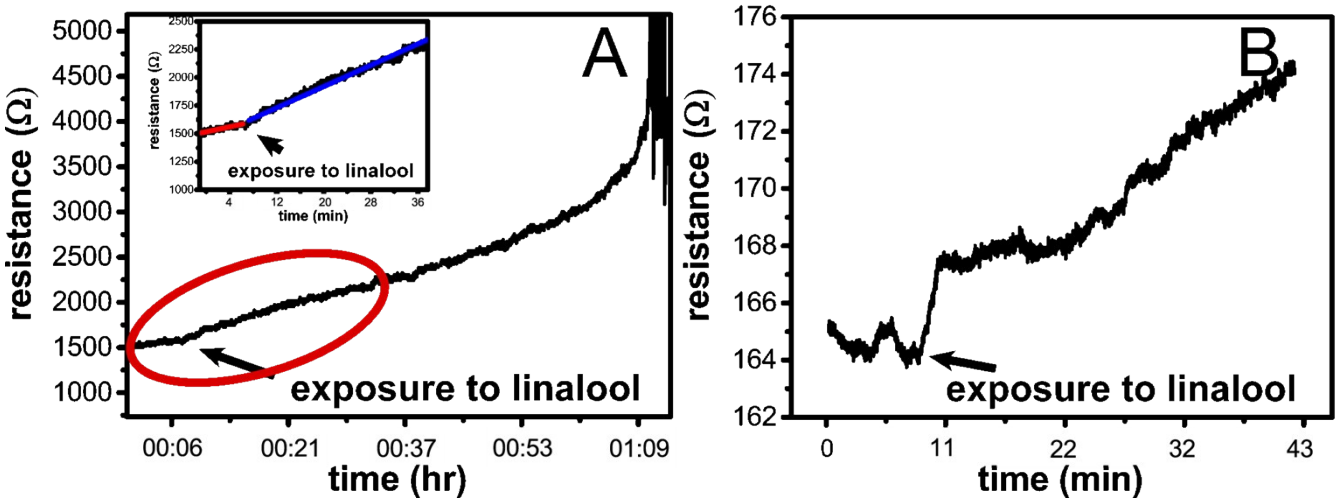

Figure S2. Resistance vs. time measurements (A) using AgNP@MIPs modified IDA-CR (2 µl of AgNP@MIPs solution in ethanol) via drop casting. Insert: zoom of A circled area. Red line: linear fit before exposure to linalool. Blue line: linear fit after exposure to linalool. (B) Using AgNP@MIPs modified IDA-CR (4 µl of AgNP@MIPs solution in ethanol) via drop casting. Linalool exposure time is marked. Temperature: 24.4 °C. Average humidity: 61%.

Figure S2B shows resistance measurements of IDA-CR with double quantity of AgNP@MIPs than spread in figure S2A. It can be seen, that the initial resistance equals 164.5±1 Ω, which is one order of magnitude lower than the initial resistance measured in figure S2A. Evidently, the IDA-CR response to linalool exposure is faster, and is reflected in a resistance jump to 168 Ω. Similarly to the previous case, the resistance constantly increased in the following 50 min, and reached 180 Ω (Δ = 10%). Then, the resistance became unstable. The linalool was removed by heating and UV illuminating the IDA-CR *vide supra*. As a result, the device resistance decreased to its initial resistance. Exposing the device once more to linalool caused the resistance to increase immediately as before, however, the signal to noise ratio was 5 times larger. Removing the linalool did not affect the resistance (ca. 175 Ω) for 20 min, after which it decreased linearly for 10 min until it reached a plateau with a resistance of ca. 170 Ω. The final resistance was approximately 5 Ω higher than the initial resistance, implying that the device was not fully recovered, and the necessity of heating and UV illumination for fully recovering the device.

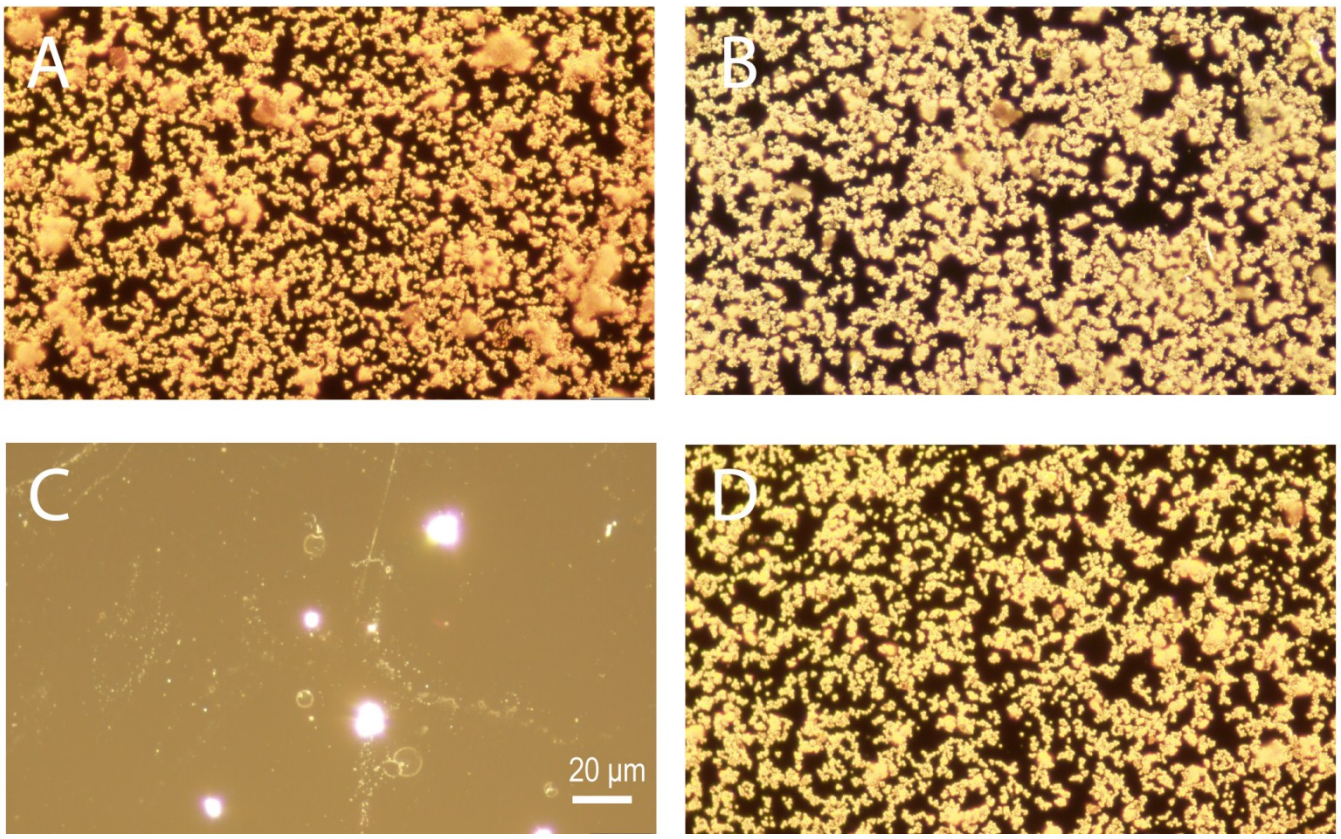

Figure S3. Optical microscope images of AgNP@NIPs attached to glass modified with PEI (A), PDDA (B), PSS (C) and APTES (D). Magnification is 50.

As shown in the figure, modification with PDDA and APTES yielded uniform distribution of AgNP@NIPs on the glass substrate. Aggregates of the particles appear when PEI was used for glass modification. Modification with PSS did not enable attachment of more than a few AgNP@NIPs.

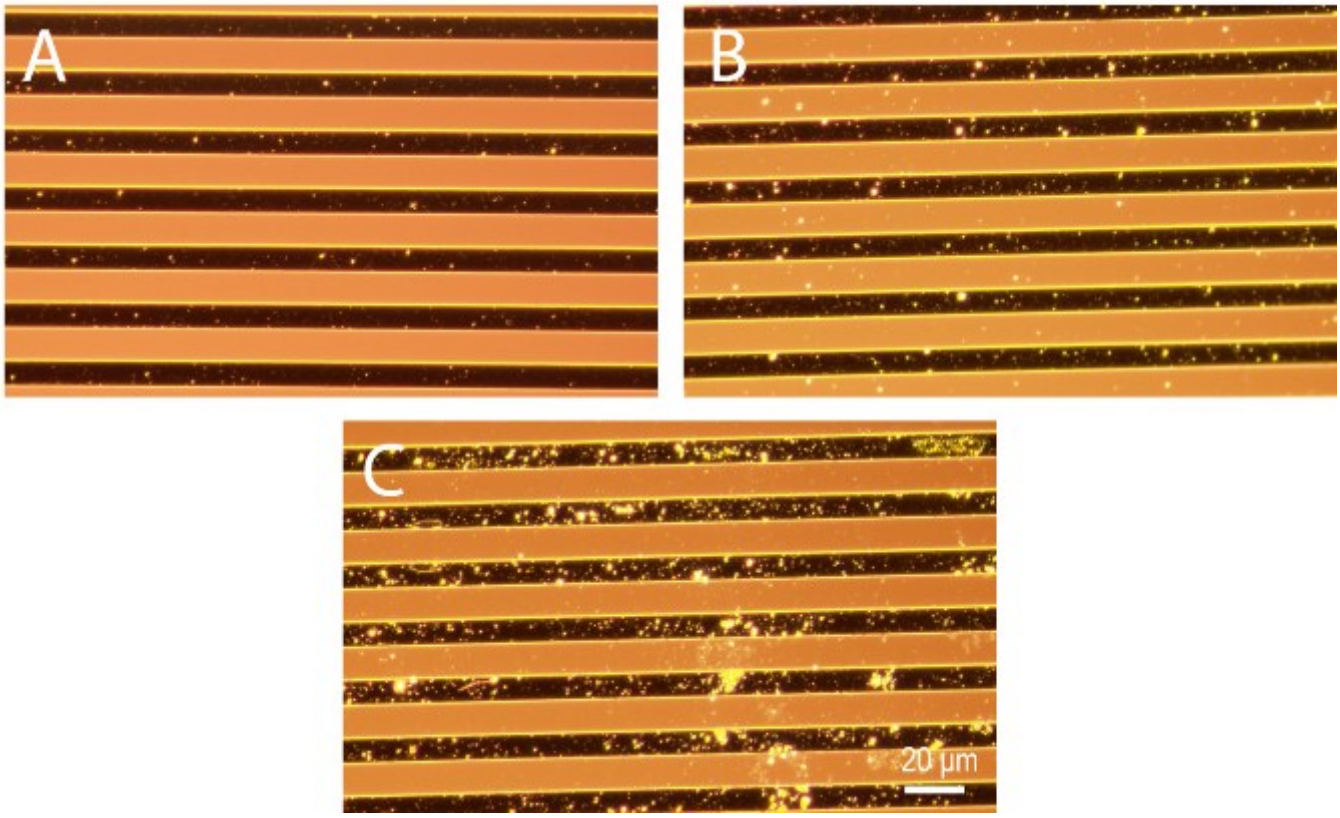

Figure S4. Optical microscope images of AgNP@NIPs attached to IDA-CR modified with PDDA.(A) with no ozone cleaning of the device prior to modification, (B) with ozone cleaning and (C) with ozone cleaning and with stirring of the particles solution during the attachement. Magnification is 50. Black stripes are the gold stripes and bright stripes are the glass substrate.

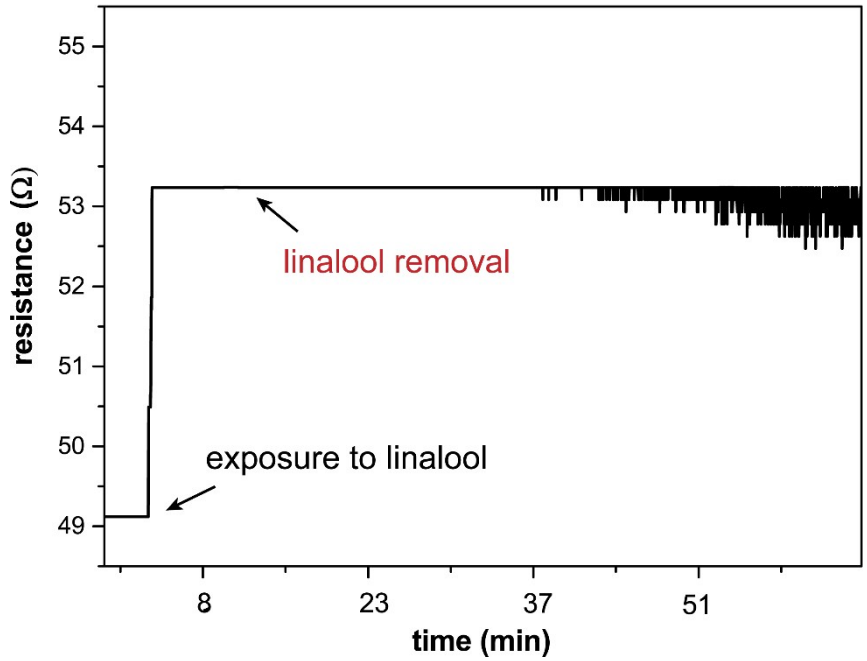

Figure S5. Resistance vs. time measurement, using AgNP@NIPs scattered on PEI modified IDA-CR. Linalool exposure and removal time are marked. Temperature: 24.4 °C. Average humidity: 61%.