

Table 1 Operating conditions for cellulose modification. Diazonium salts section: previously synthesized compounds. Amines section: amine precursors for *in situ* synthesized diazonium salts.

Reagent	Mass for 0.3 mmol (6 mL of 0.05 M solution)	Washing solvent	Chemical function introduced onto paper
Diazonium salts			
4-nitrobenzenediazonium tetrafluoroborate	71.1 mg	Ethanol (96% (v/v) in H ₂ O)	NO ₂
4-mercaptobenzenediazonium tetrafluoroborate	67.2 mg	Ethanol (96% (v/v) in H ₂ O)	SH
4-carboxybenzenediazonium tetrafluoroborate	70.8 mg	0.1 M sodium hydroxide	COOH
4-(2-ammonioethyl)benzenediazonium tetrafluoroborate	96.8 mg	0.1 M hydrochloric acid	(primary) NH ₂
4-azidobenzenediazonium tetrafluoroborate	69.9 mg	Ethanol (96% (v/v) in H ₂ O)	N ₃
Amines			
4-(2-aminoethyl)-aniline	40.9 mg	0.1 M hydrochloric acid	(primary) NH ₂
4-azidoaniline hydrochloride	51.2 mg	Ethanol (96% (v/v) in H ₂ O)	N ₃

Table 2 Operating conditions for antibodies grafting.

Paper	Bioconjugate Technique	Antibody grafted
Unmodified paper		
Nitrocellulose (AE98 Fast)	Deposit of the mAb (40 μL cm ⁻²) Overnight incubation at 4°C	anti-OVA mAb
Cellulose (CF1)	Deposit of the mAb (40 μL cm ⁻²) Overnight incubation at 4°C	anti-OVA mAb
Modified cellulose: chemical group borne by paper		
Nitro (NO ₂)	Deposit of the mAb (40 μL cm ⁻²) Overnight incubation at 4°C	anti-OVA mAb
Thiol (SH)	Deposit of the maleimido-mAb (40 μL cm ⁻²) Overnight incubation at 4°C	SMCC-anti-OVA mAb
Primary Amine (NH ₂)	Thiols introduction Deposit of the maleimido-mAb (40 μL cm ⁻²) Overnight incubation at 4°C	SMCC-anti-OVA mAb
Carboxyl (COOH)	EDC/Sulfo-NHS activation of carboxyl groups Deposit of the mAb (40 μL cm ⁻²) Overnight incubation at 4°C	anti-OVA mAb
Azide (N ₃)	Deposit of the mAb (40 μL cm ⁻²) Antibody concentration by drying at 40°C for 30 min in an air oven Irradiation at 365 nm (1050 μW cm ⁻²) for 15 min	anti-OVA mAb

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Table 3 Characterization of the grafted chemical functions.

Chemical function	Most conclusive analysis	Characteristic signal	Figure
Nitro (NO ₂)	IR	NO ₂ antisymmetric stretching vibration at 1525 ± 5 cm ⁻¹ NO ₂ symmetric stretching vibration at 1350 ± 5 cm ⁻¹	Figure 5 (a)
Thiol (SH)	XPS	S 2p orbital Binding Energy at 164 ± 0.35 eV S 2s orbital Binding Energy at 220 ± 0.35 eV	Figure 5 (b)
Primary Amine (NH ₂)	Ninhydrin staining XPS	Brown color specific to primary amines N 1s orbital Binding Energy at 400 ± 0.35 eV	(not shown) Figure 5 (c)
Azide (N ₃)	Colloidal-gold-labeled antibody localized grafting	Color from the grafted biomolecule following the mask	Figure 5 (d)
Carboxyl (COOH)	IR & XPS & Dye	Merging into cellulose signal	