Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Tunable bioelectrodes with wrinkled-ridged graphene oxide surfaces for electrochemical nitrate sensors

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Figure S1. A homemade stretcher setup for pre-stretching PDMS substrate.

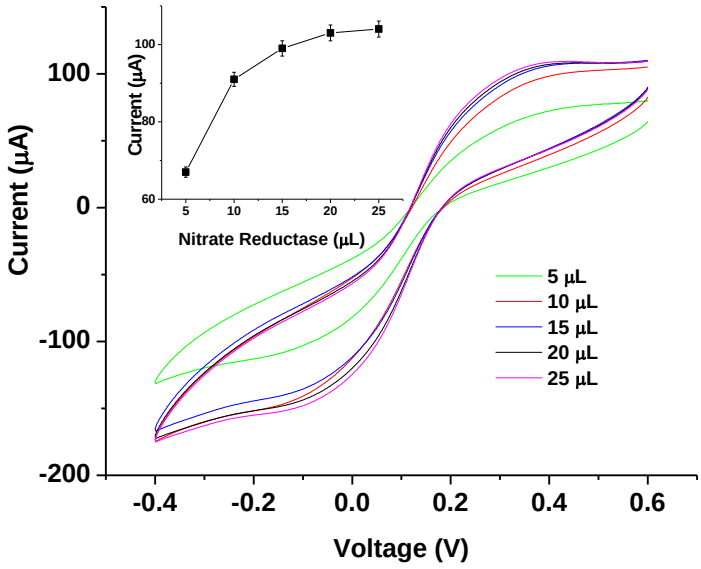

Figure S2. CV curves for NiR/GO-Au-PDMS bioelectrode (pre-stretch: 8.0%; scan rate: 10 mV/s) by varying the volume of enzyme solution (3.5 mg/mL) during enzyme immobilization. Inset summarizes the peak current as a function of volume of enzyme solution drop-coated on the electrode. Specifically, to optimize amount of enzyme molecules covalently immobilized on the fabricated electrodes and investigate enzyme activity, we drop-coated the electrode surface with different volumes of PBS solution containing enzyme molecules (3.5 mg/mL), and then conducted cyclic voltammetry (CV) studies for the formed bioelectrodes (pre-stretch: 8.0%) in presence of nitrate ions at scan rate of 10 mV/s. The peak current increased with increasing volume of enzyme molecules, due to availability of more enzyme active sites for more catalytic conversion with nitrate ions. The peak current was saturated at 20 μL volume of enzyme solution. The saturation of current may be due to an optimum level of catalytic reactions between the enzyme and nitrate ions where all enzyme molecules on the electrode surface were involved in the reactions.

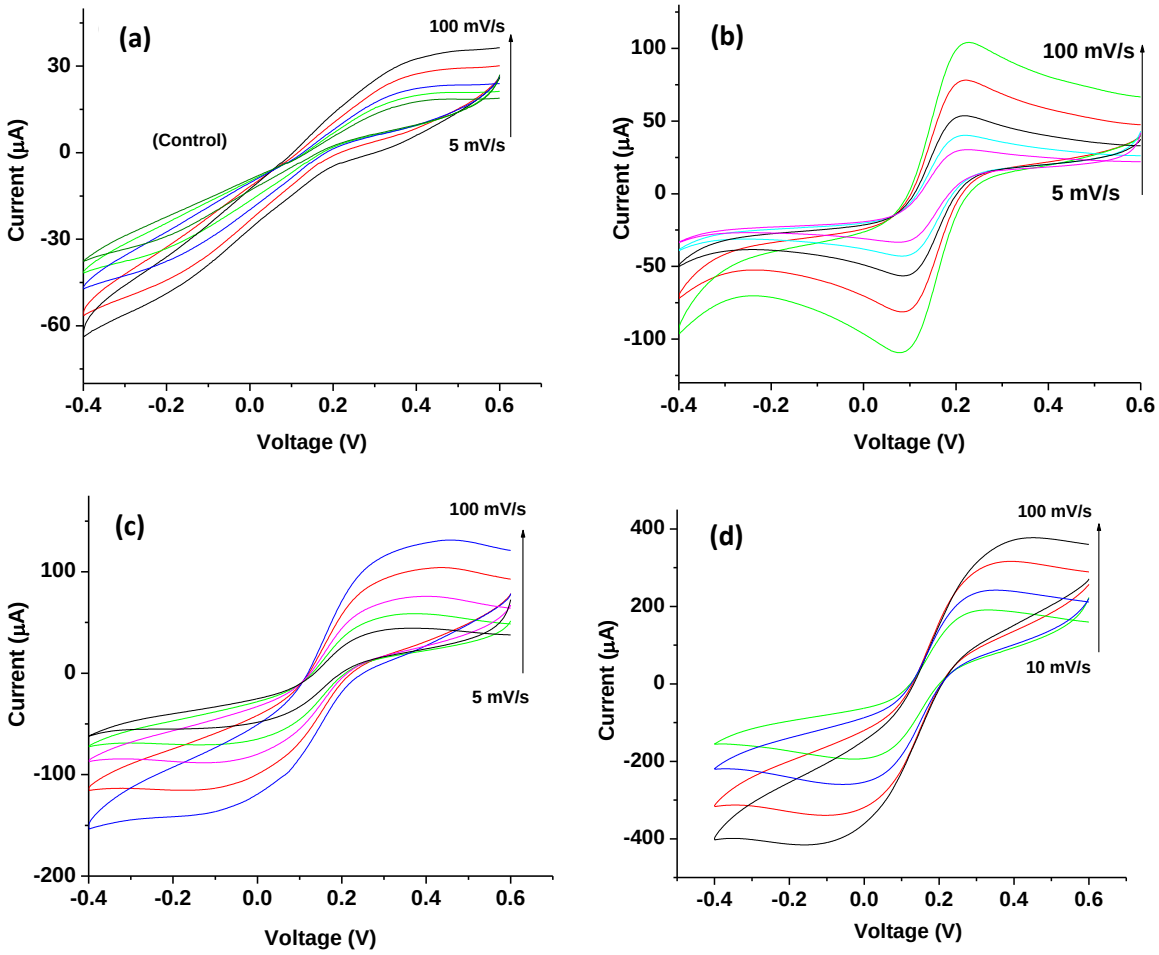

Figure S3. Scan rate studies for various NiR/GO-Au bioelectrodes in presence of PBS solution (50 mM, pH 7.0, 0.9 % NaCl) containing 5 mM $[Fe(CN)_6]^{3-/4-}$ redox probe with different pre-stretch values: (a) 0%, control), (b) 2.7 %, (c) 5.1 %, and (d) 8 %. The scan rate was varied from 5 to 100 mV/s.

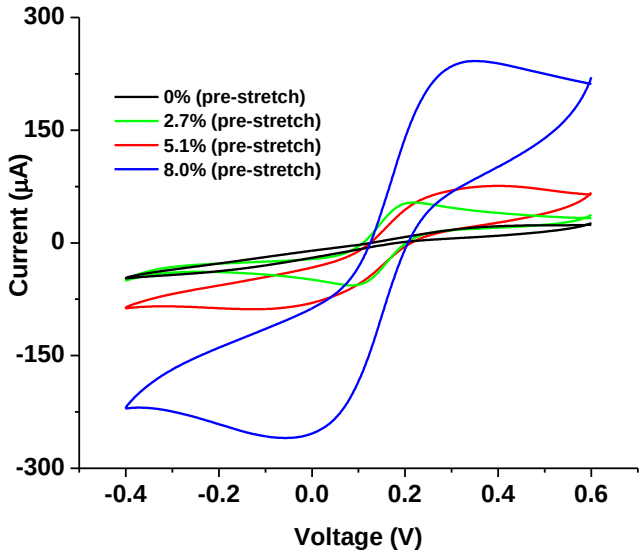

Figure S4. CV curves for various NiR/GO-Au bioelectrodes in presence of PBS solution (50 mM, pH 7.0, 0.9 % NaCl) containing 5 mM $[Fe(CN)_6]^{3-/4-}$ redox probe with different pre-stretch values: 0 % (control), 2.7 %, 5.1 %, and 8.0 % at scan rate of 20 mV/s.

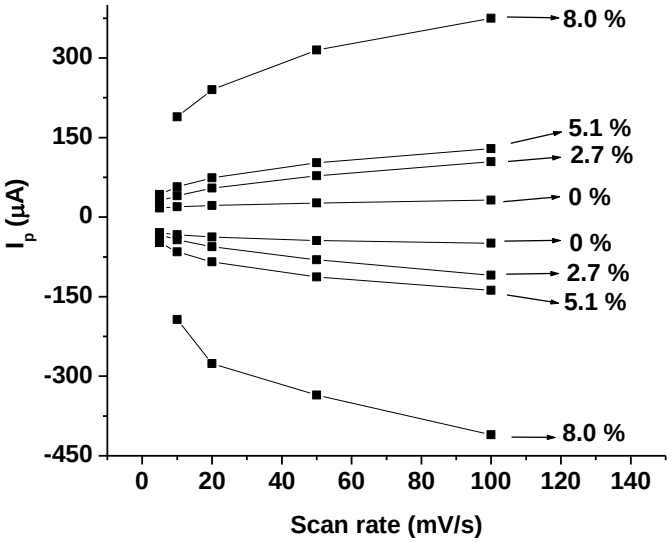

Figure S5. I_p as a function of scan rates for various NiR/GO-Au bioelectrodes with different pre-stretch values: 0% (control), 2.7 %, 5.1 %, and 8 %. The scan rate was varied from 5 to 100 mV/s.

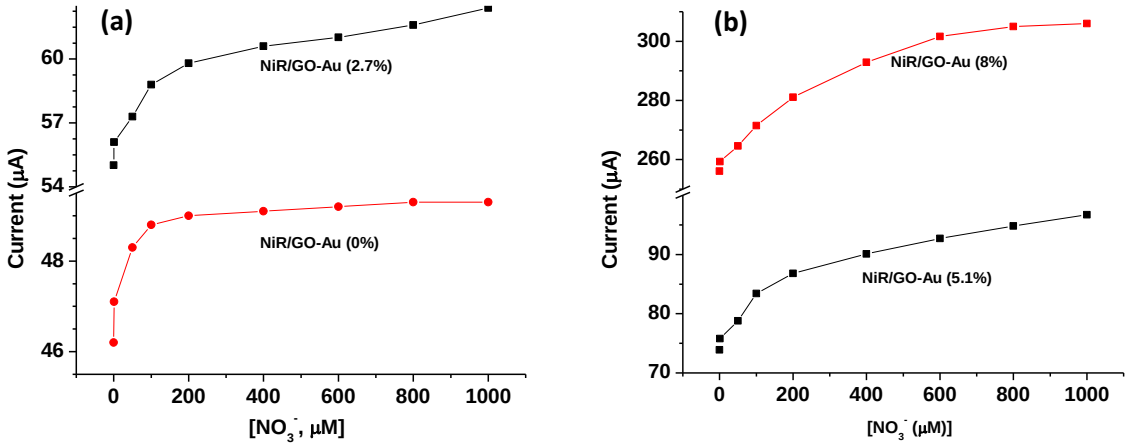

Figure S6. Sensing performances for all the fabricated NiR/GO-Au bioelectrodes at different pre-strains: (a) 0 % and 2.7 % and (b) 5.1 % and 8%.

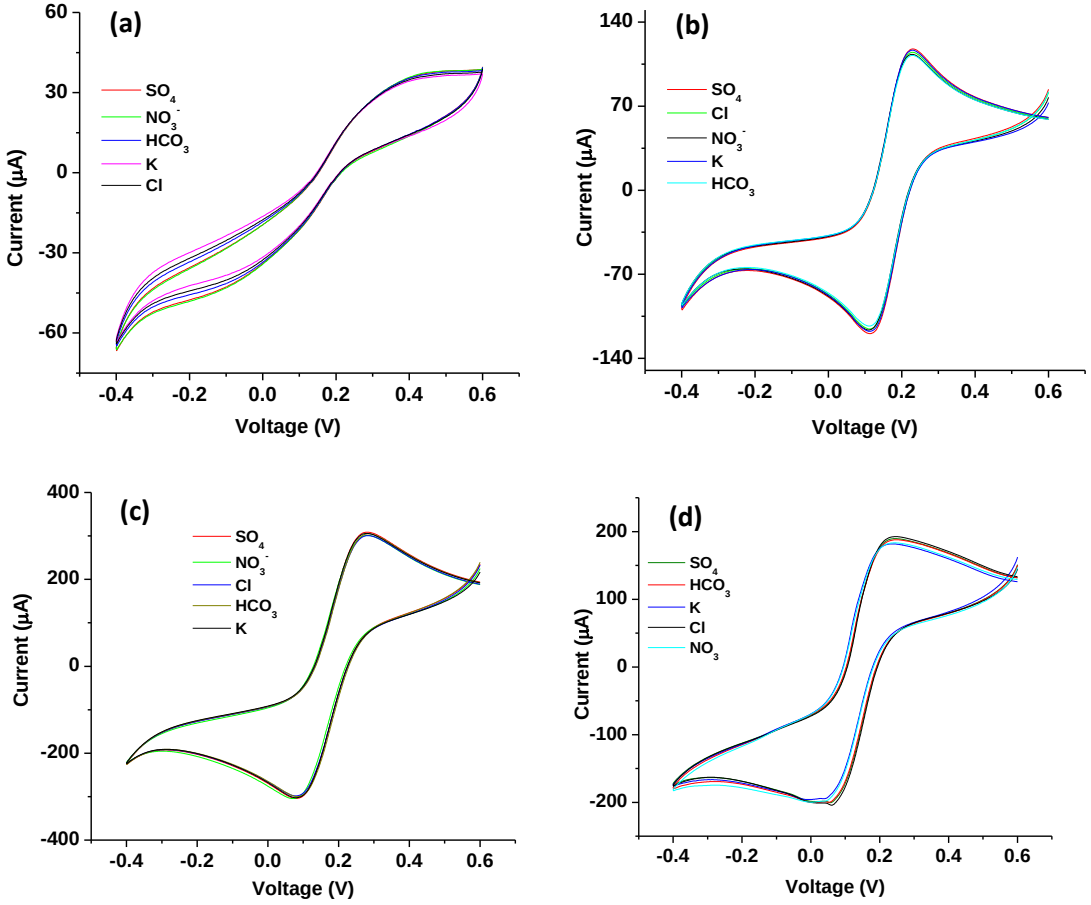

Figure S7. Selectivity studies of all the fabricated NiR/GO-Au bioelectrodes in presence of nitrate ions and various interfering ions at the scan rate of 20 mV/s. Different pre-strains were applied to the bioelectrodes, including (a) 0 %, (b) 2.7 %, (c) 5.1 %, and (d) 8.0%.