# Electronic Supplementary Information (ESI)

# High Enzymatic Activity Preservation of Malate Dehydrogenase immobilized in Langmuir-Blodgett Film and Its Electrochemical Biosensor Application for Malic Acid Detection

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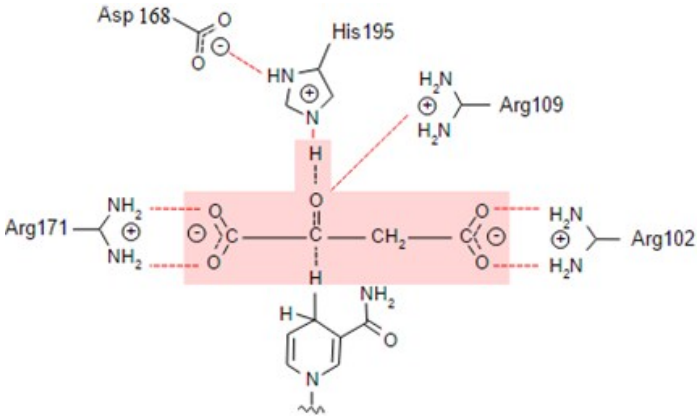


**Figure S1**. Active site of MDH.

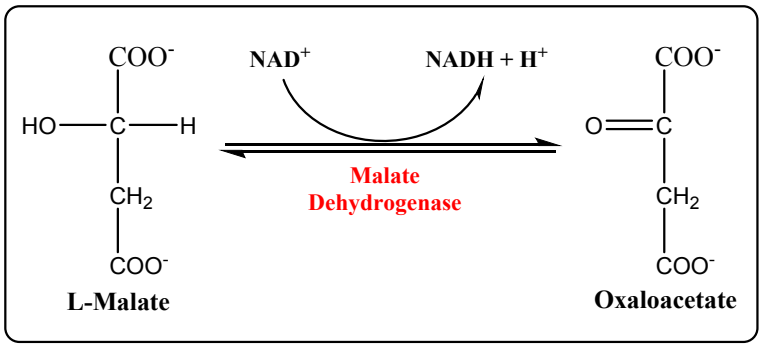


**Figure S2**. Biocatalytic activity of malate dehydrogenase enzyme.

**Table S1.** Comparison of MDH–ODA/ITO electrode with other electrochemical sensors for quantification of MA.

| Electrode | Technique | pH | Sensitivity | Linear region | Detection limit | Reference |
|---|---|---|---|---|---|---|
| pH electrode | potentiometry | 7.4 | - | 0.1-4.0 g/L | 0.1 g/L | 40 |
| MDH-SWCNT[a]/GCE[b] | amperometry | 9.3 | 0.455 $\mu AmM^{-1}$ | 0.2-0.8 mM | 0.033 mM | 41 |
| Graphite | voltammetry | 8.0 | - | - | 0.0004 g/L | 42 |
| AgA-PE[c] | DPV[d] | 2.0 | 630 $\mu AmM^{-1}$ | 0.002-0.1 mM | 0.0005 mM | 43 |
| MDH–ODA/ITO | voltammetry | 7.4 | 0.04 $\mu AmM^{-1}cm^{-2}$ | 2.2-50.0 mM | 0.66 mM | this work |

*[a] single-walled carbon nanotube, [b] glassy carbon electrode, [c] silver amalgam paste electrode [d] differential puls voltammetry*