Supporting Information

Formation of Au/Au_9Ga_4 Alloy Nanoshell on Bacterial Surface through Galvanic Displacement Reaction for High-Contrast Imaging

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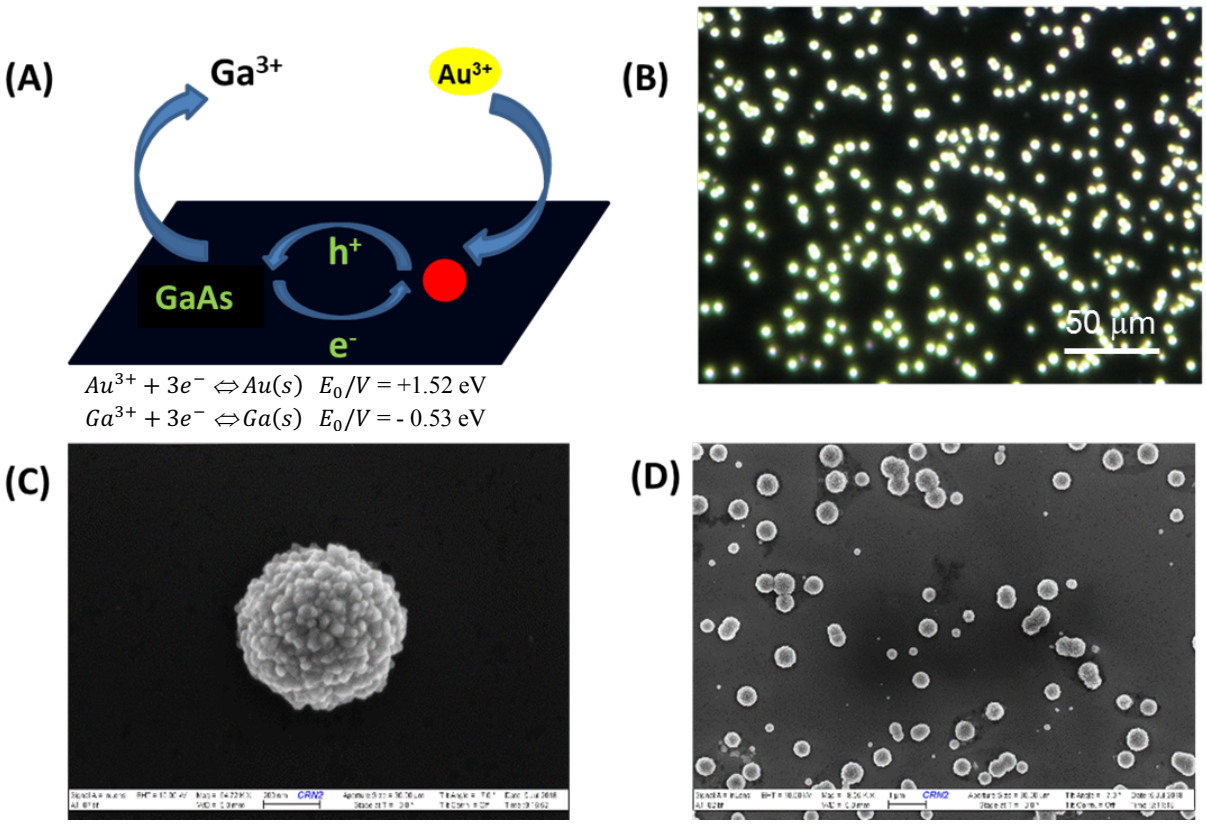

$Au^{3+} + 3e^- \Leftrightarrow Au(s)$ E_0/V = +1.52 eV

$Ga^{3+} + 3e^- \Leftrightarrow Ga(s)$ E_0/V = - 0.53 eV

Figure S1: (a) Graphical representation of the electron transfer reaction between GaAs substrate and gold ion. (b) Optical microscopy image of gold nanoparticles developed on the surface of GaAs through the galvanic displacement reaction. (c) SEM image of a gold nanoparticle cluster developed on the GaAs surface. (d) Uniform distribution of gold nanoparticles on the GaAs substrate confirmed by an SEM image of the large surface area.

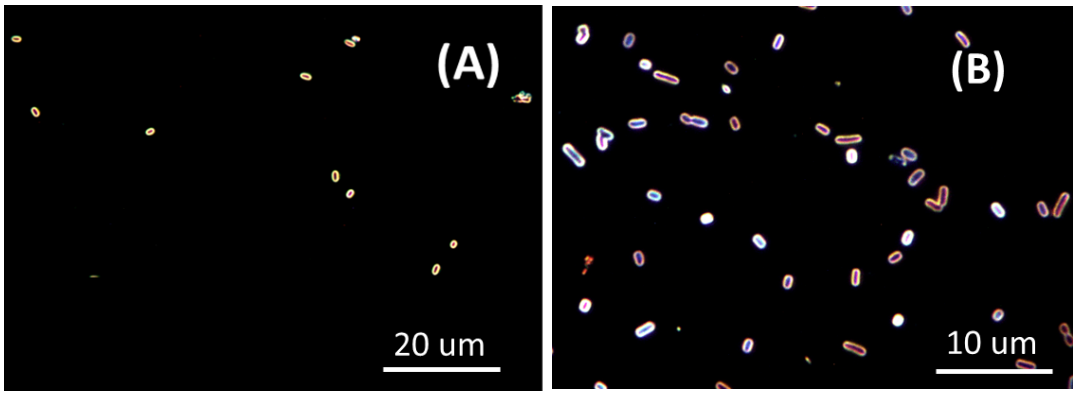

Figure S2: Optical microscopy images of (a) a non-functionalized chip exposed to 10^6 CFU/ml of gold coated *E. coli*, and (b) an antibody-functionalized chip exposed to 10^6 CFU/ml of gold coated *E. coli*.

Table 1: Zeta potentials of *E. coli* before and after treatment in gold ionic liquid.

Sample	**Zeta potentials (mV)**
E.coli	-51.6 ± 1.5
E.coli + I.L. 1a + $AuCl_3$ (1mM for 10^9 CFU/mL)	-41.0 ± 1.1
E.coli + I.L. 1a + $AuCl_3$ (2mM for 10^9 CFU/mL)	-30.6 ± 1.3
E.coli + I.L. 1b + $AuCl_3$ (1mM for 10^9 CFU/mL)	-43.0 ± 1.5
E.coli + I.L. 1b + $AuCl_3$ (2mM for 10^9 CFU/mL)	-34.2 ± 1.4

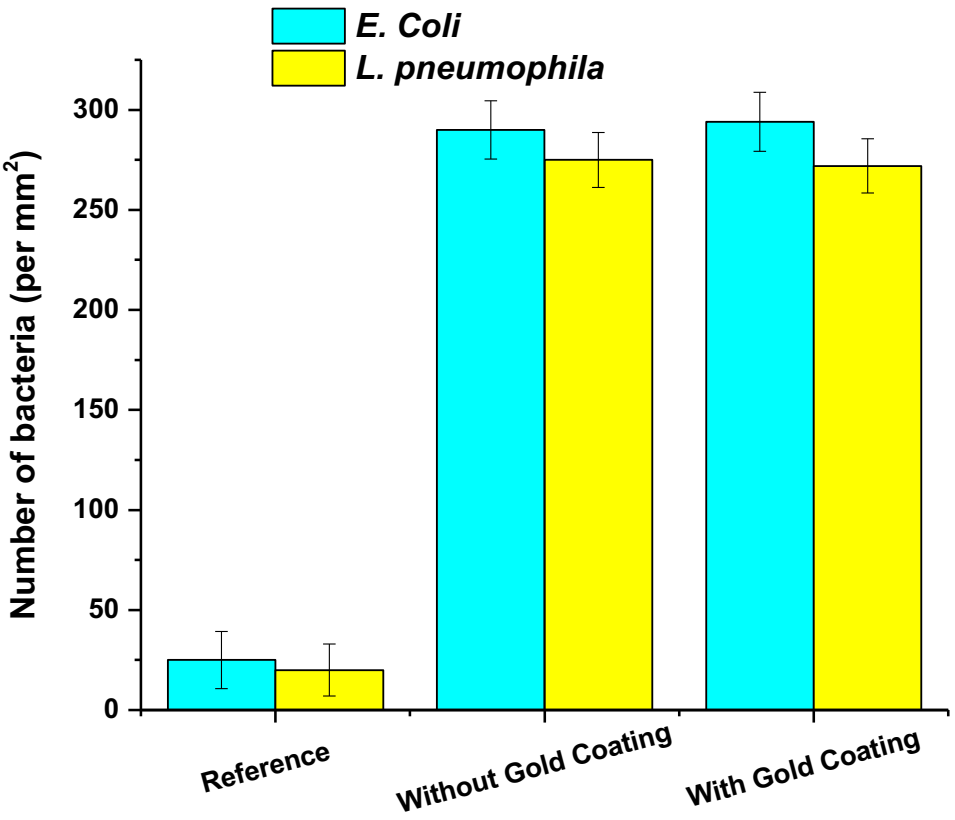

Figure S3: Comparison of bacteria capturing tendency of specific Ab functionalized samples exposed for 1 hour to respective bacteria in PBS at 10^5 CFU/mL. The "Reference" corresponds to a non functionalized GaAs surface.

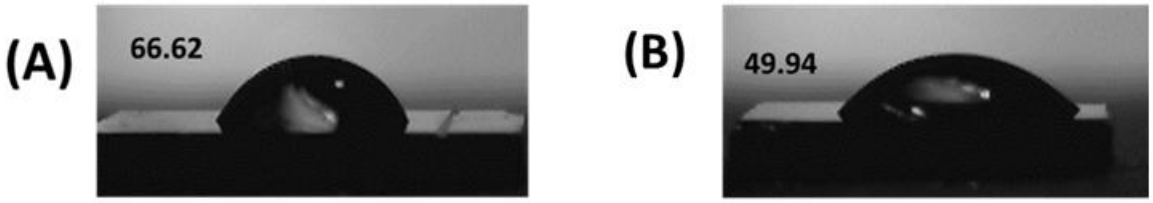

Figure S4: Contact angle measurements of the GaAs substrate exposed to 10^8 CFU/mL of (a) *L. pneumophila* bacteria, (b) gold functionalized *L. pneumophila* bacteria.

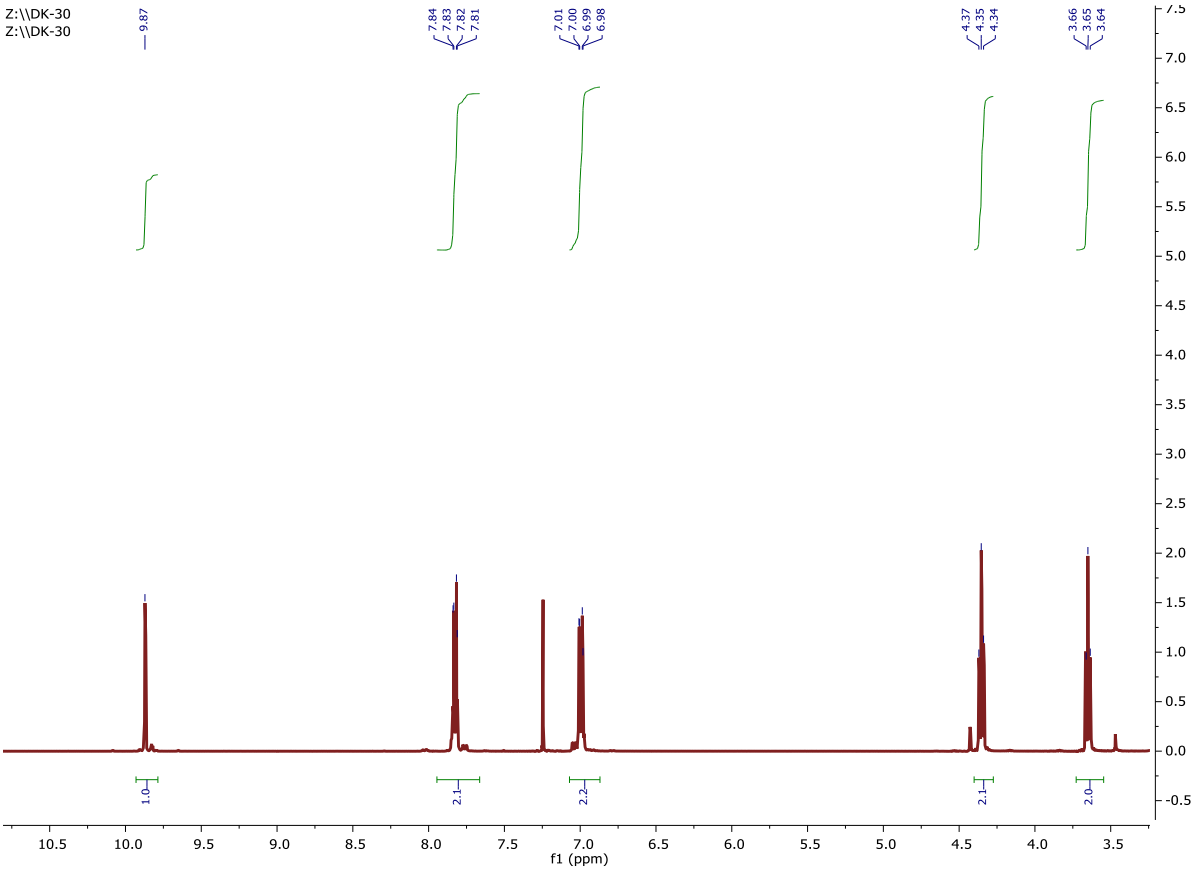

Figure S5: ^{1}H NMR of compound **2a**.

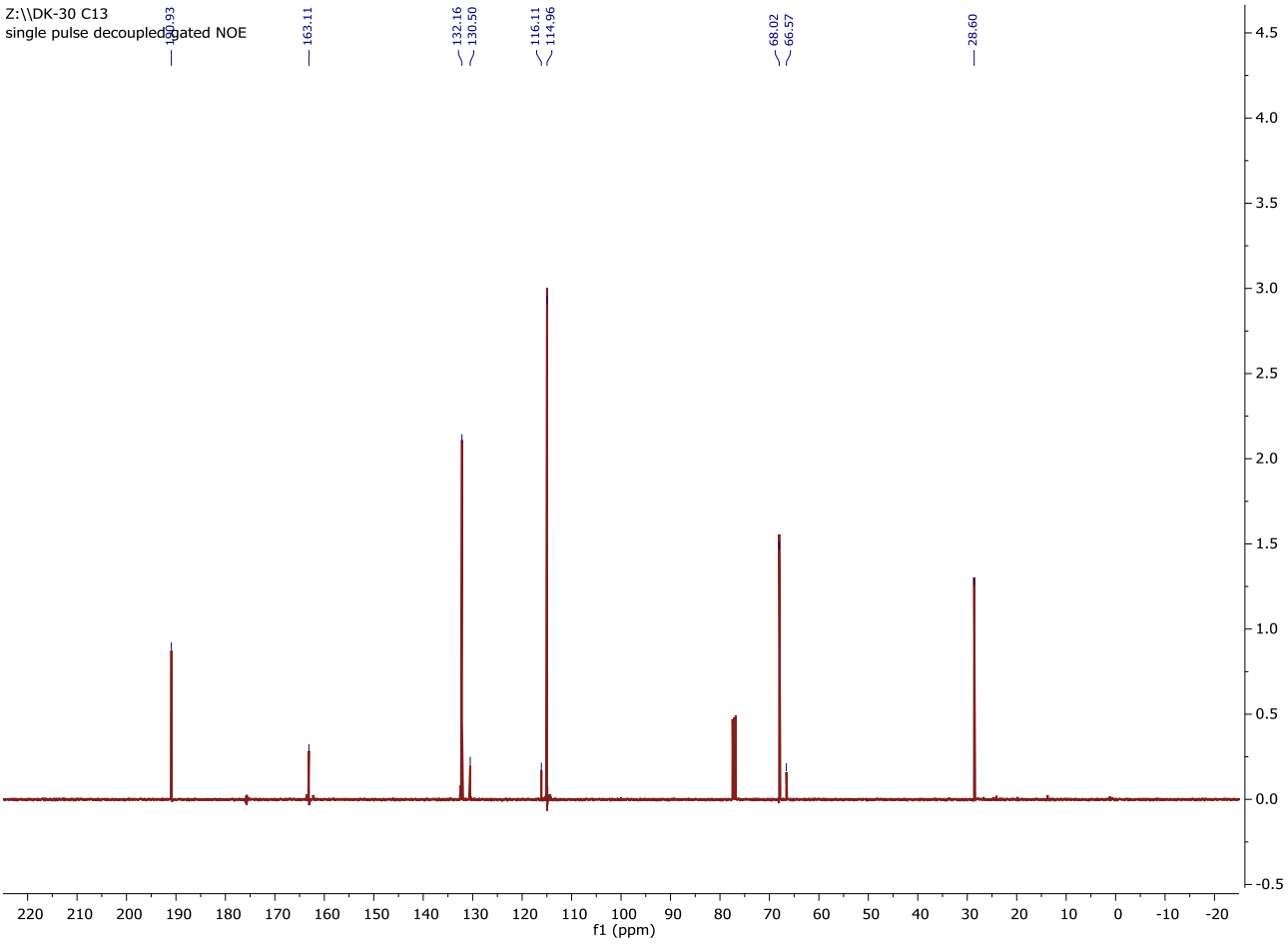

Figure S6: ^{13}C NMR of compound **2a**.

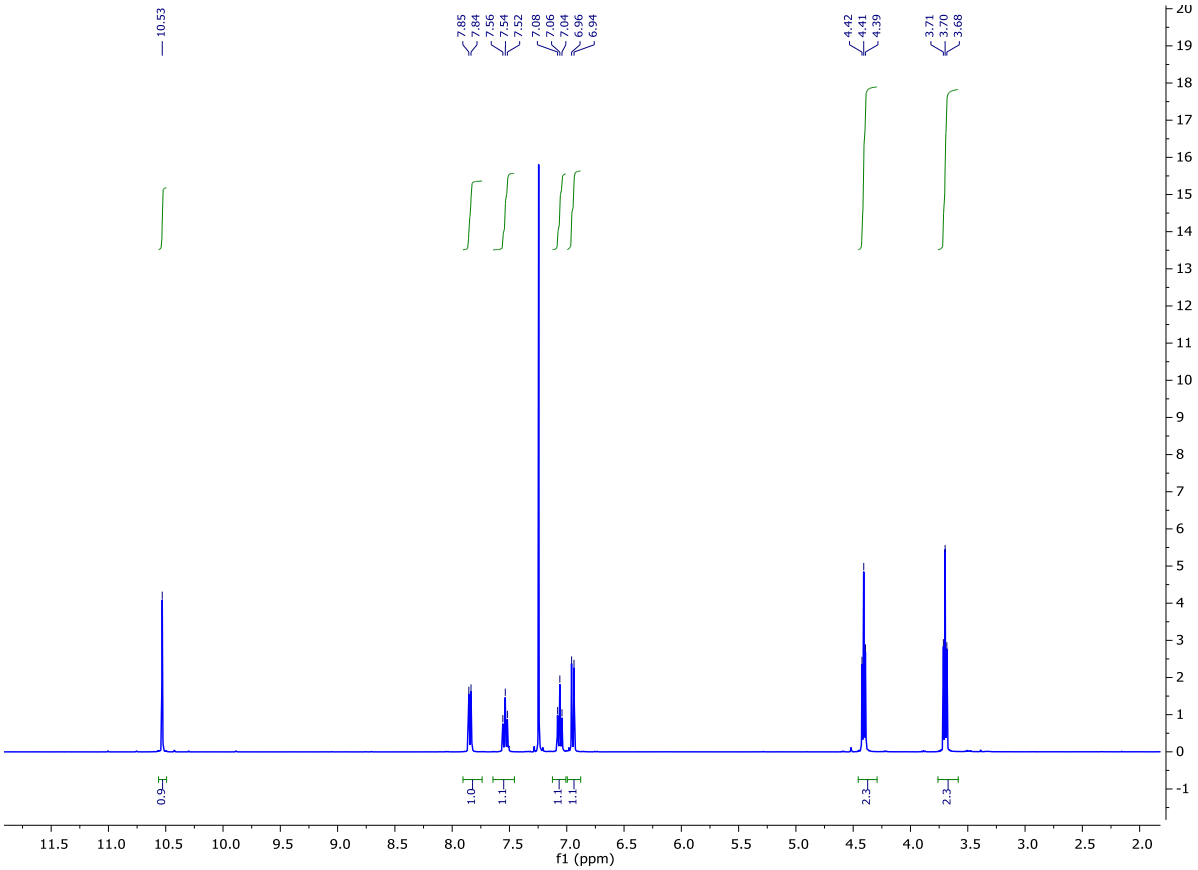

Figure S7: ^{1}H NMR of compound **2b**.

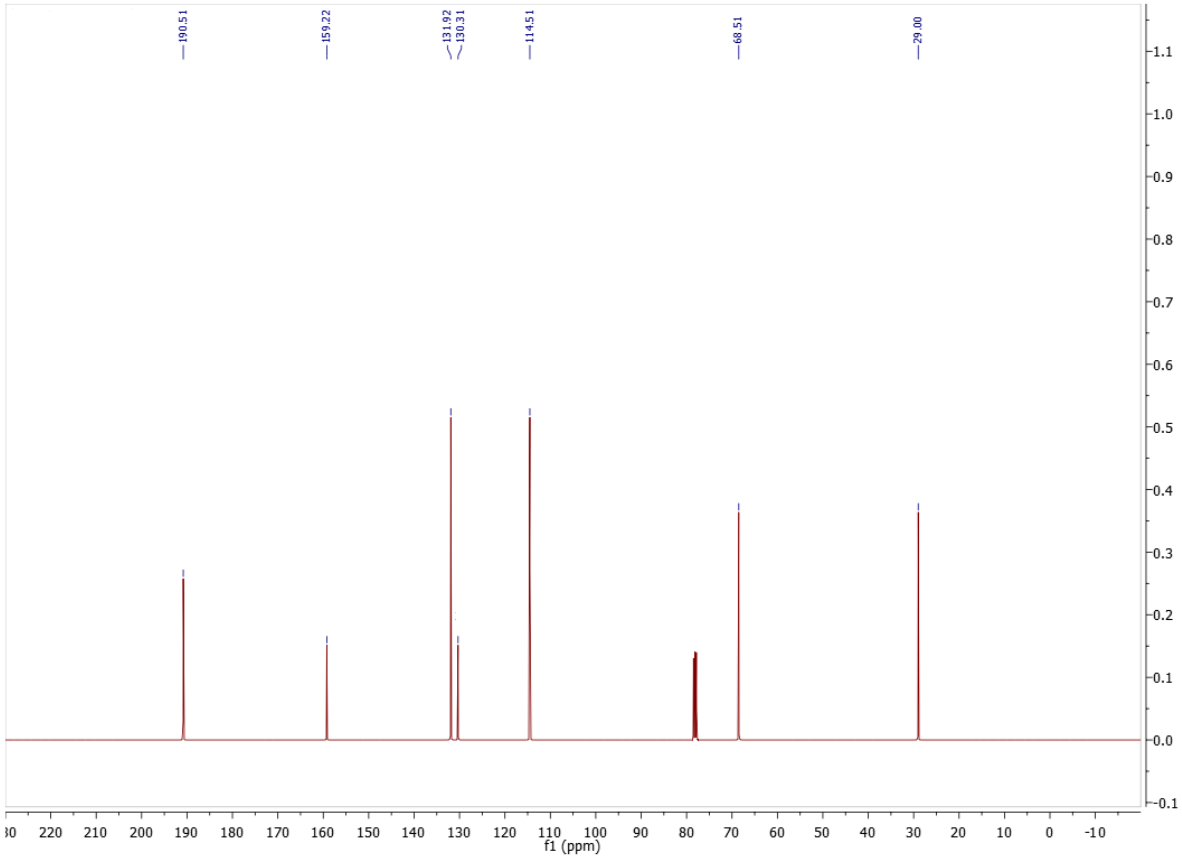

Figure S8: ^{13}C NMR of compound **2b**.

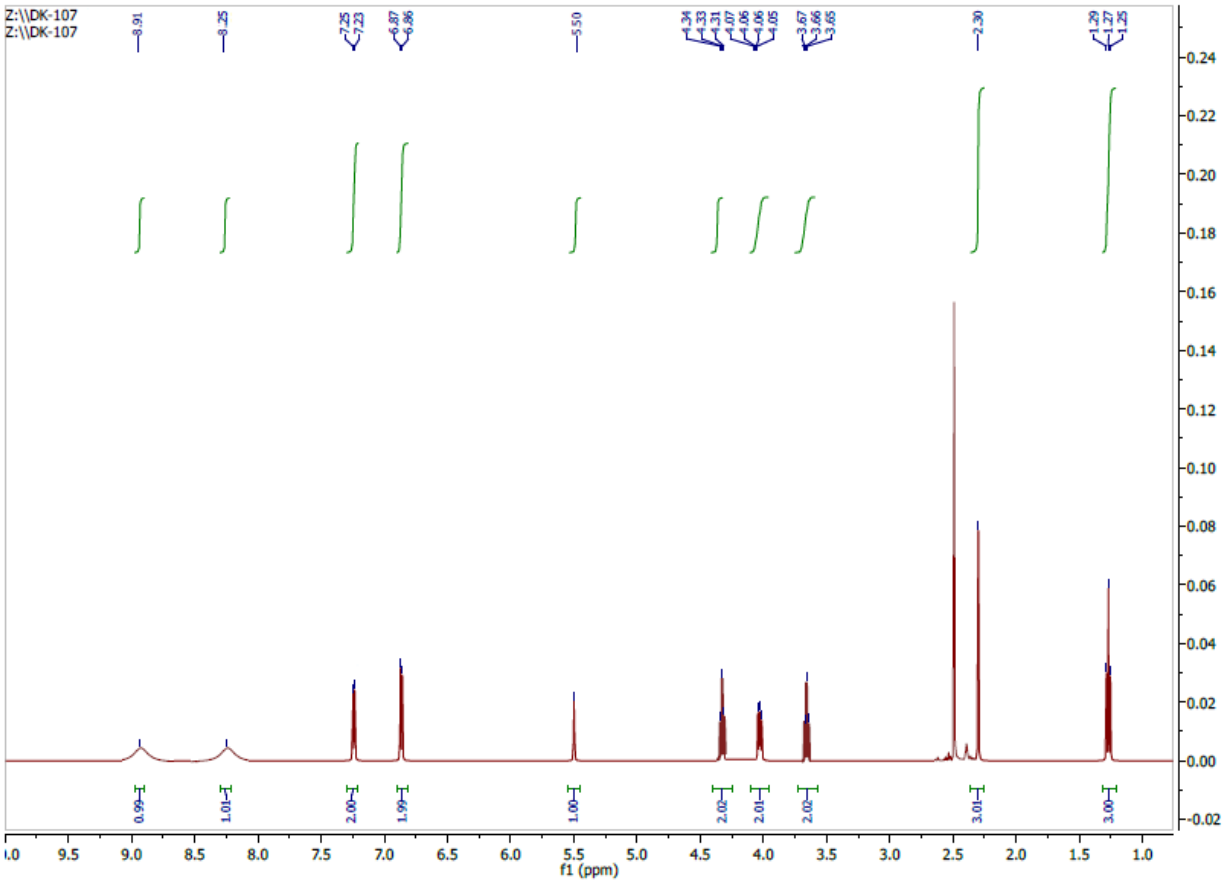

Figure S9: ^{1}H NMR of compound **3a**.

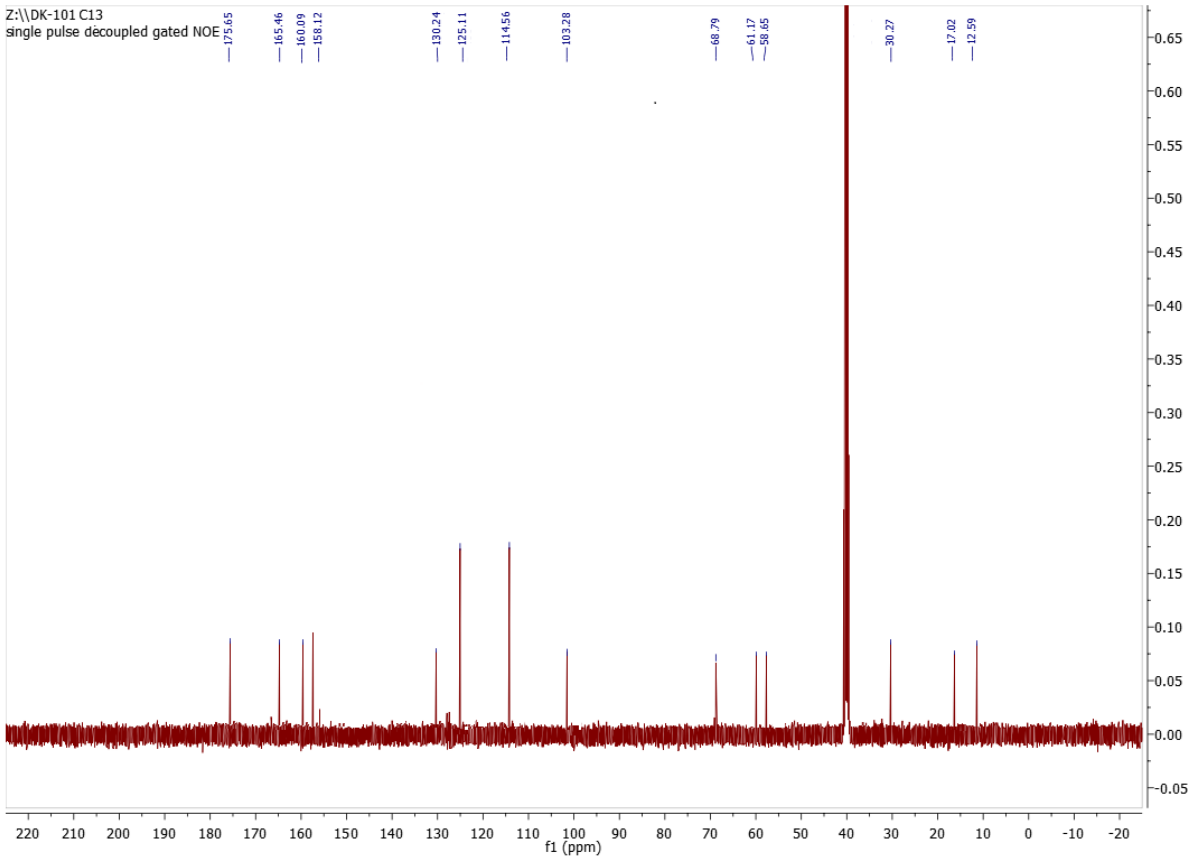

Figure S10: ^{13}C NMR of compound **3a**.

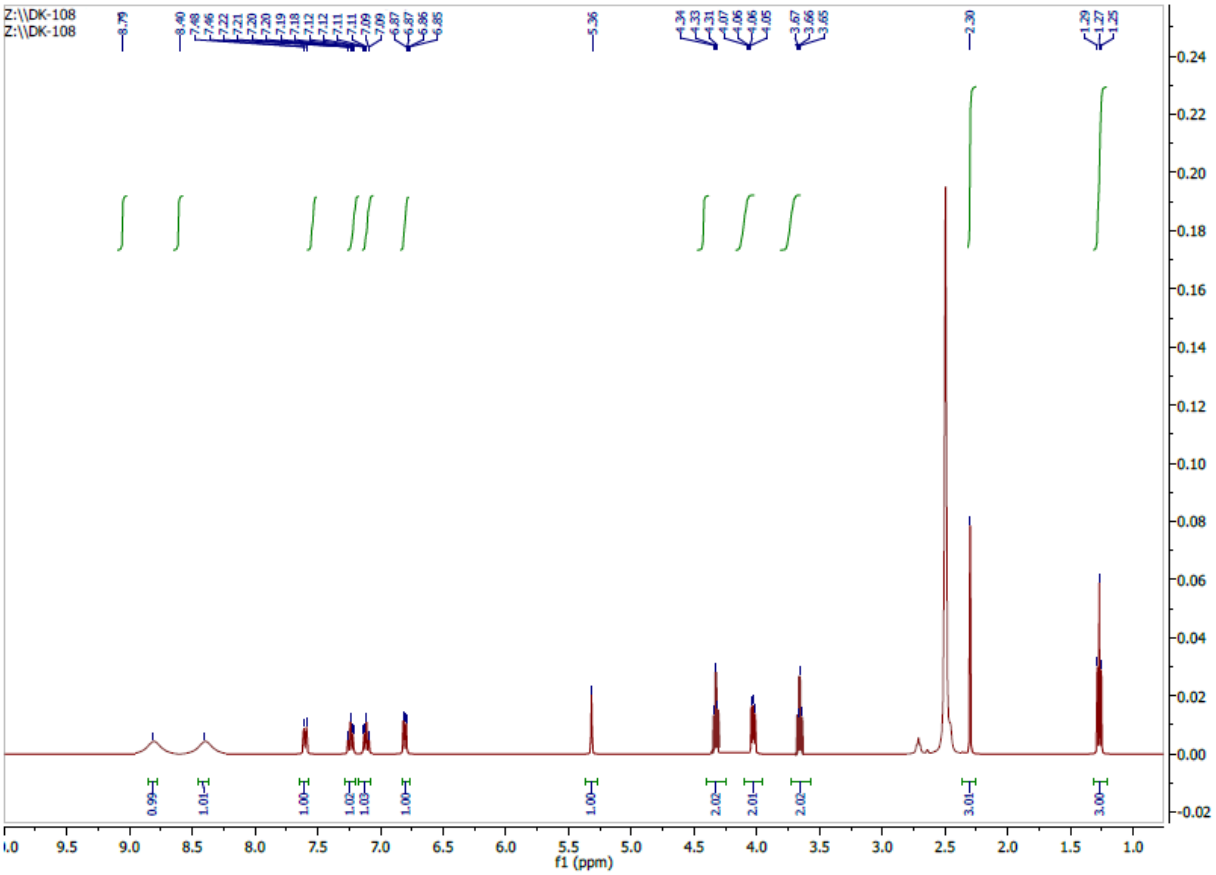

Figure S11: ^{1}H NMR of compound **3b**.

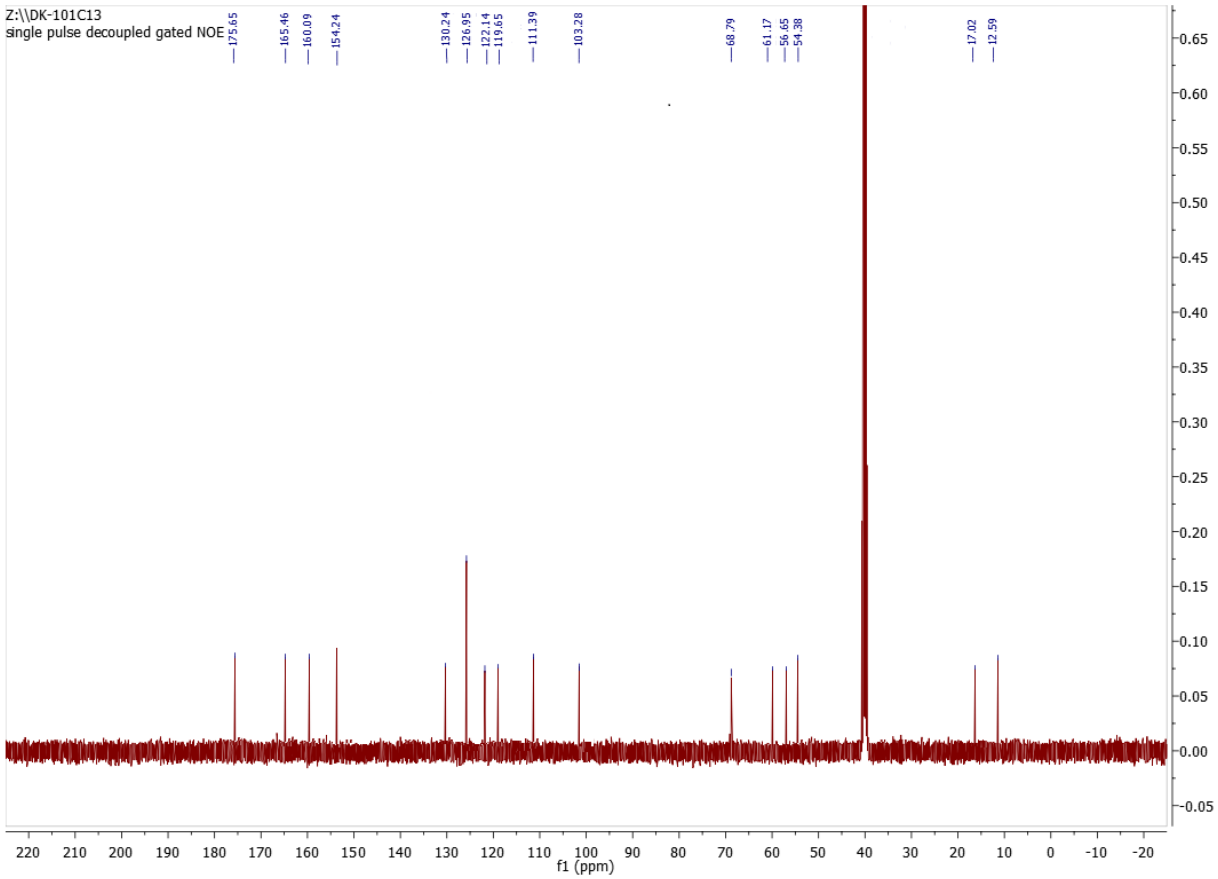

Figure S12: ^{13}C NMR of compound **3b**.

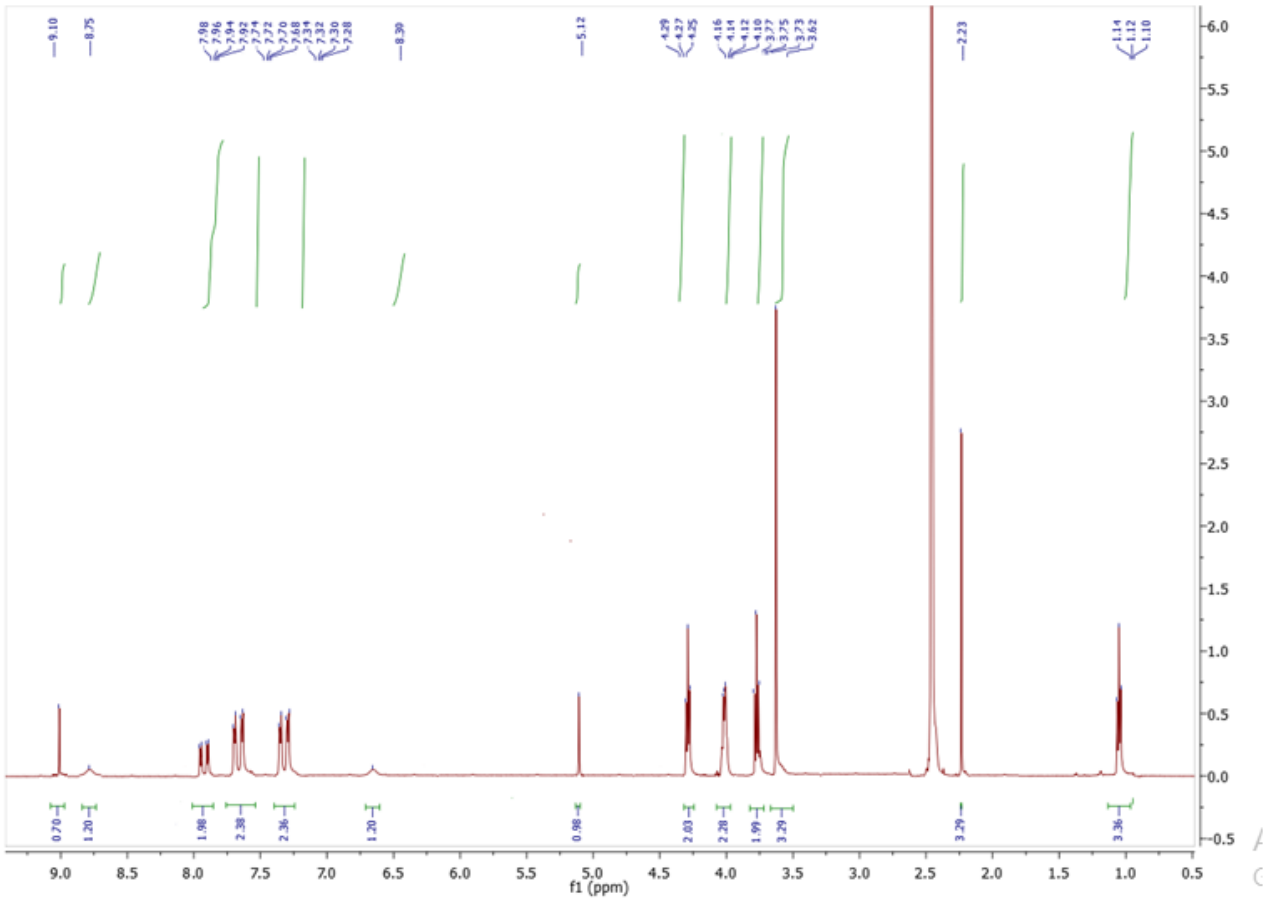

Figure S13: ^{1}H NMR of compound **IL-1a**.

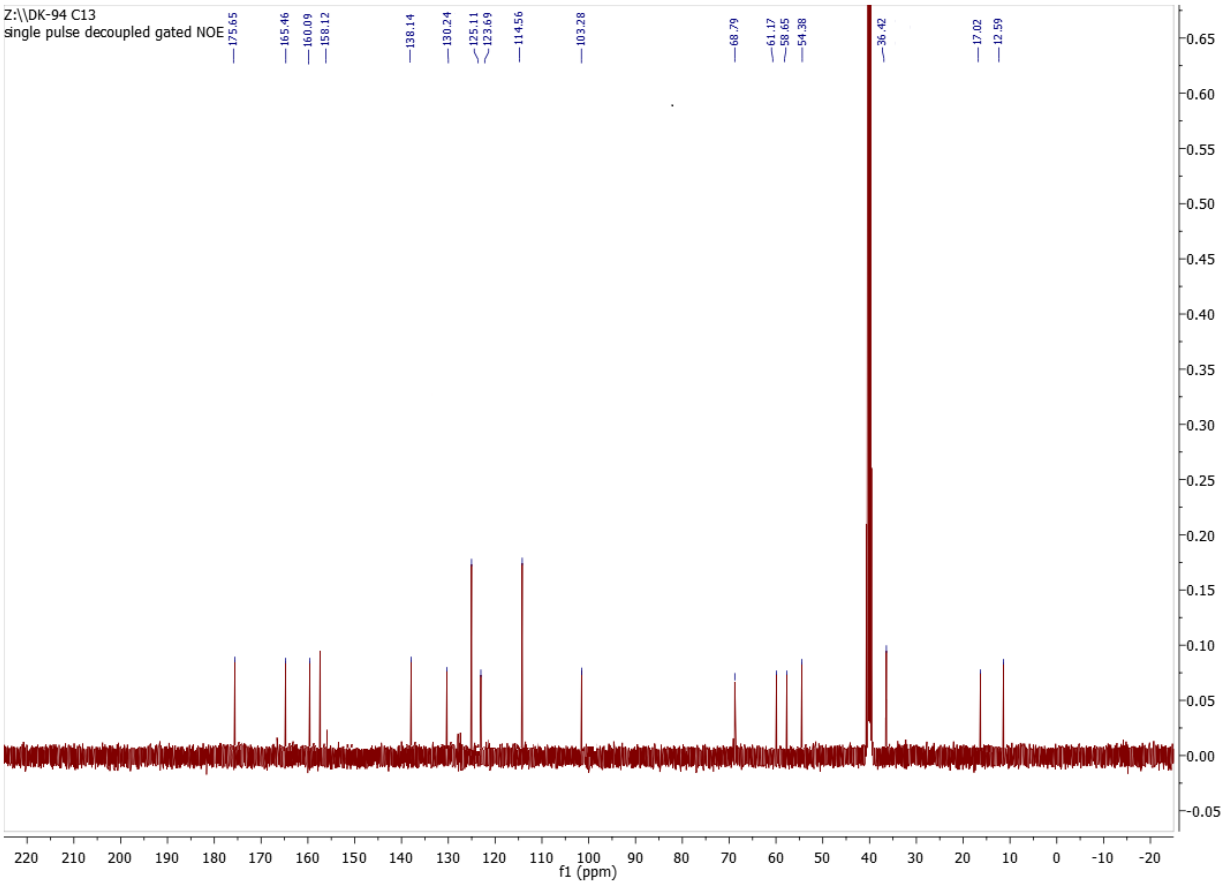

Figure S14: ^{13}C NMR of compound **IL-1a**.

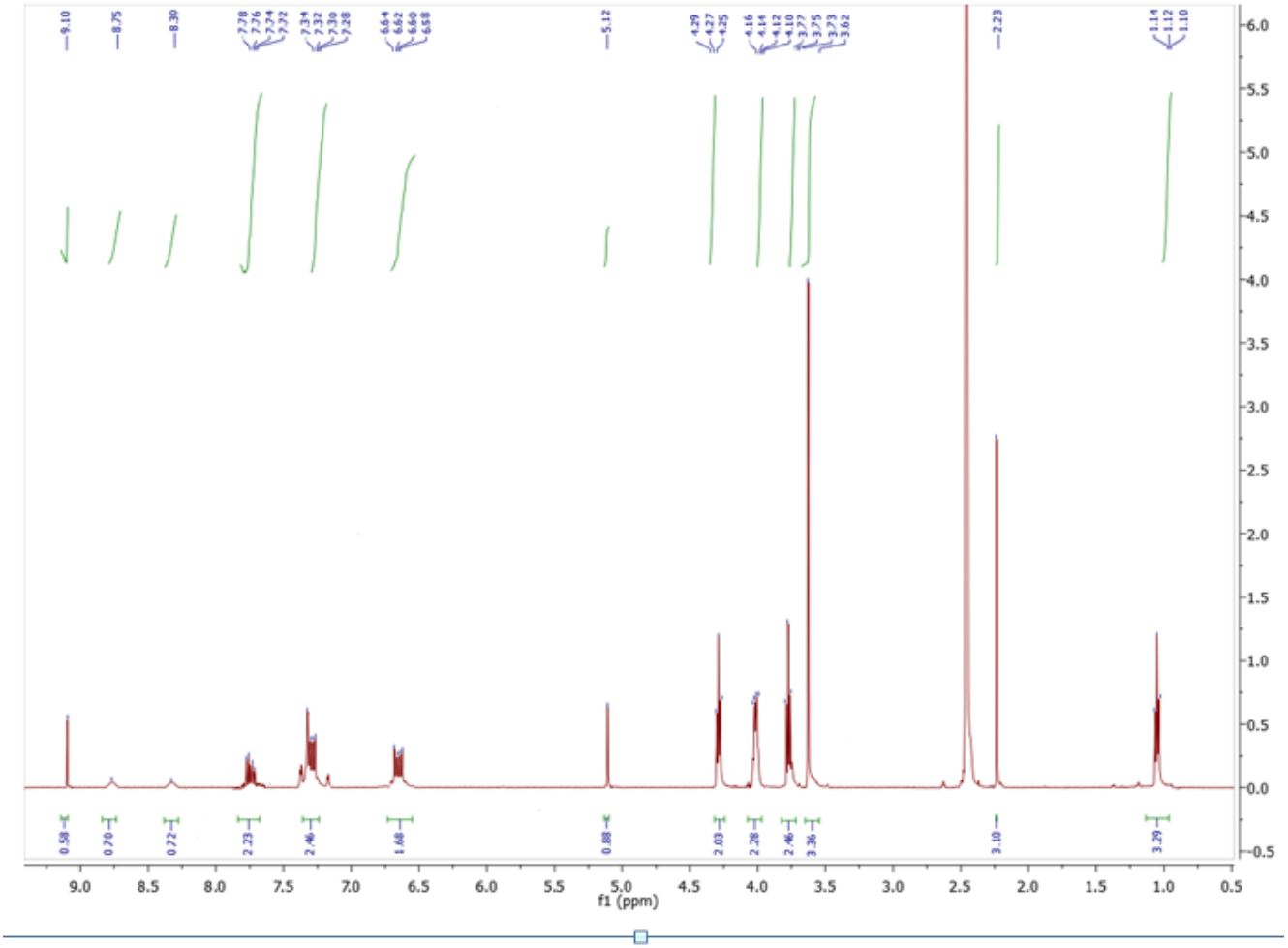

Figure S15: ^{1}H NMR of compound **IL-1b**.

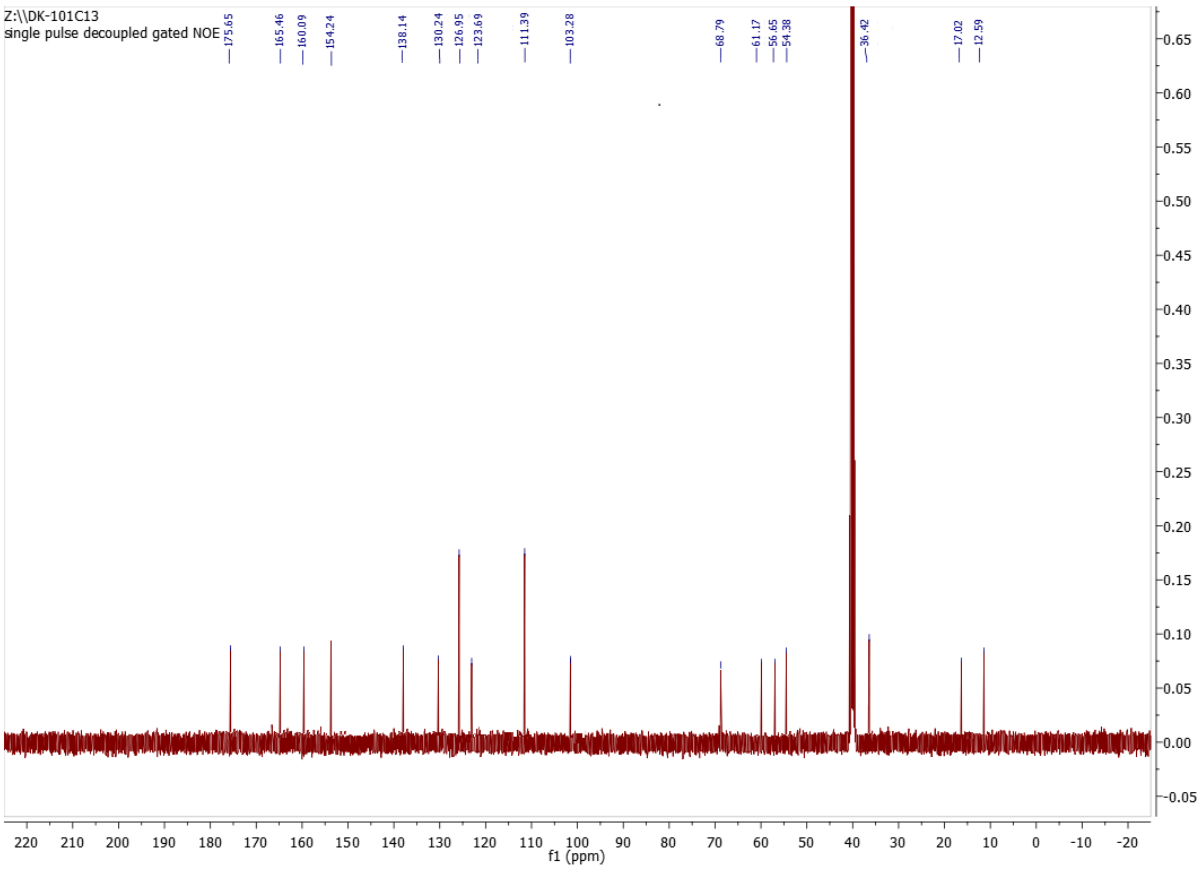

Figure S16: ^{13}C NMR of compound **IL-1b**.

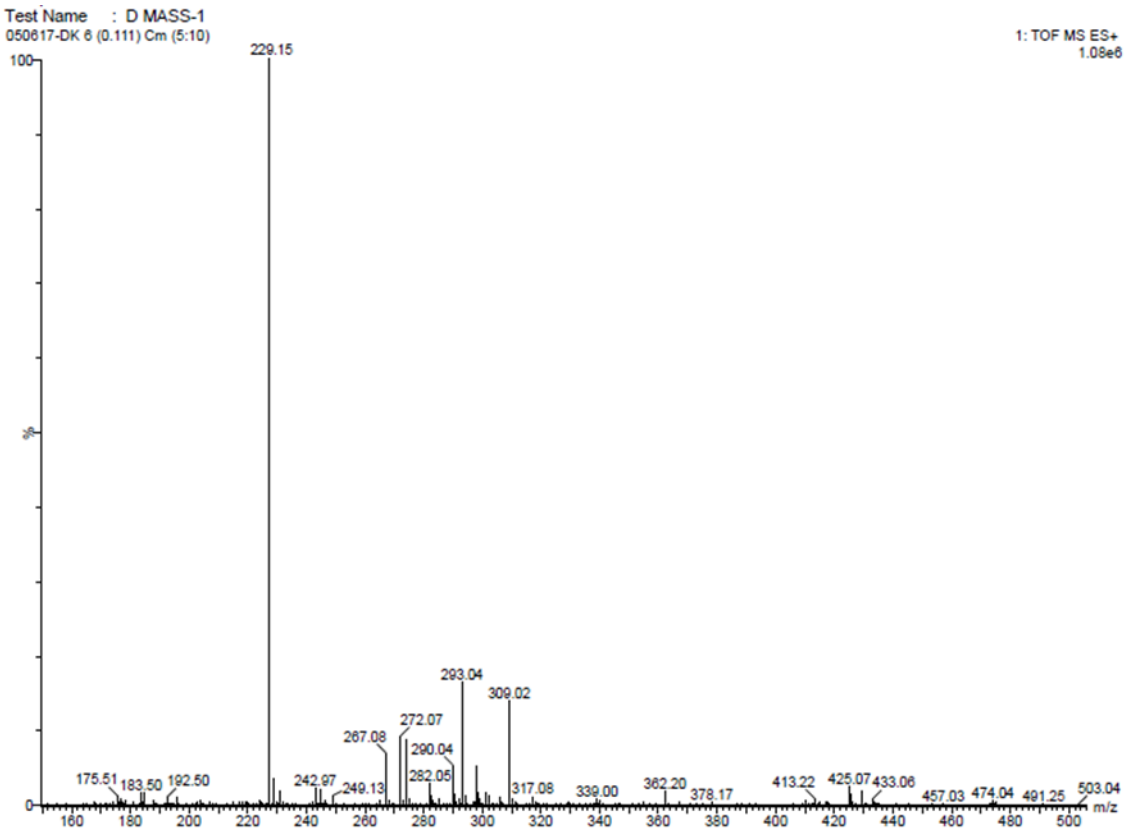

Figure S17: Massspectrum of compound **2a**.

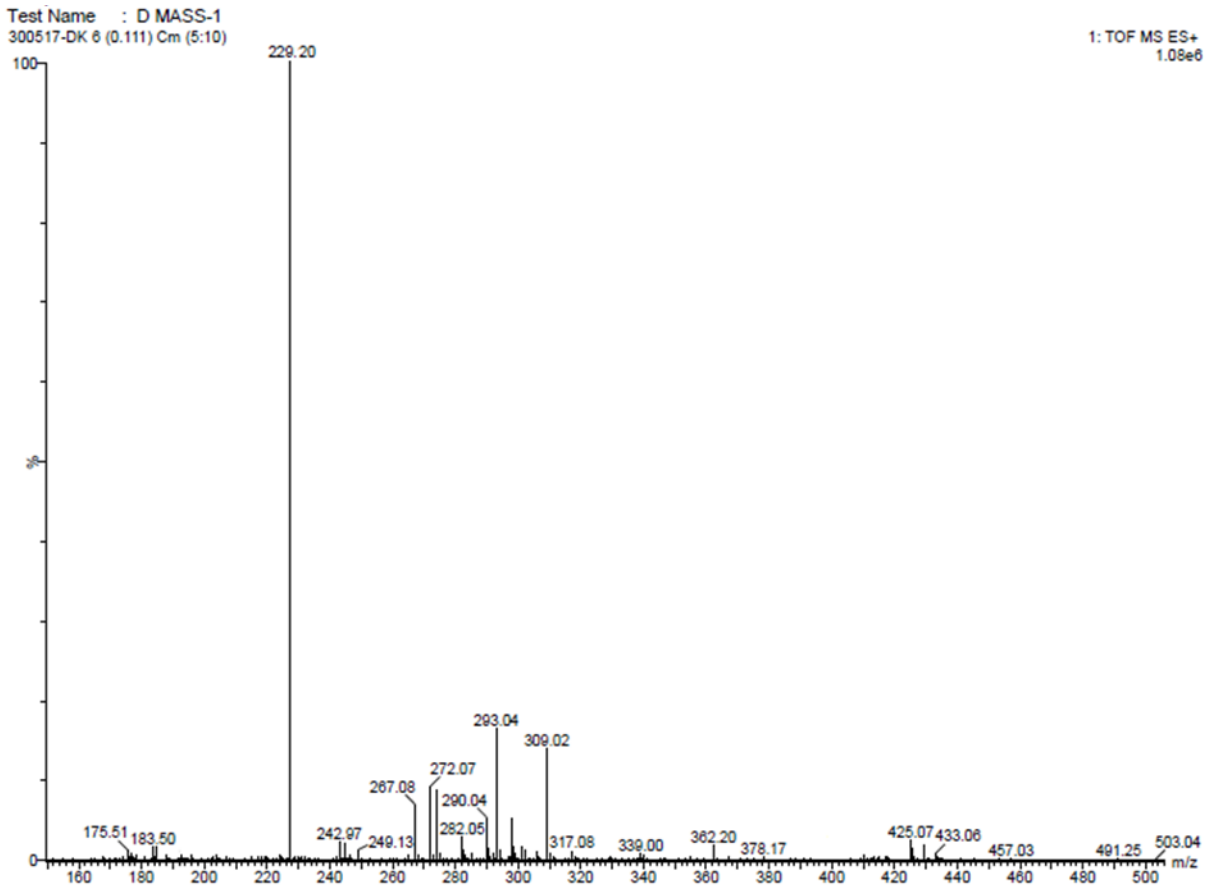

Figure S18: Massspectrum of compound **2b**.

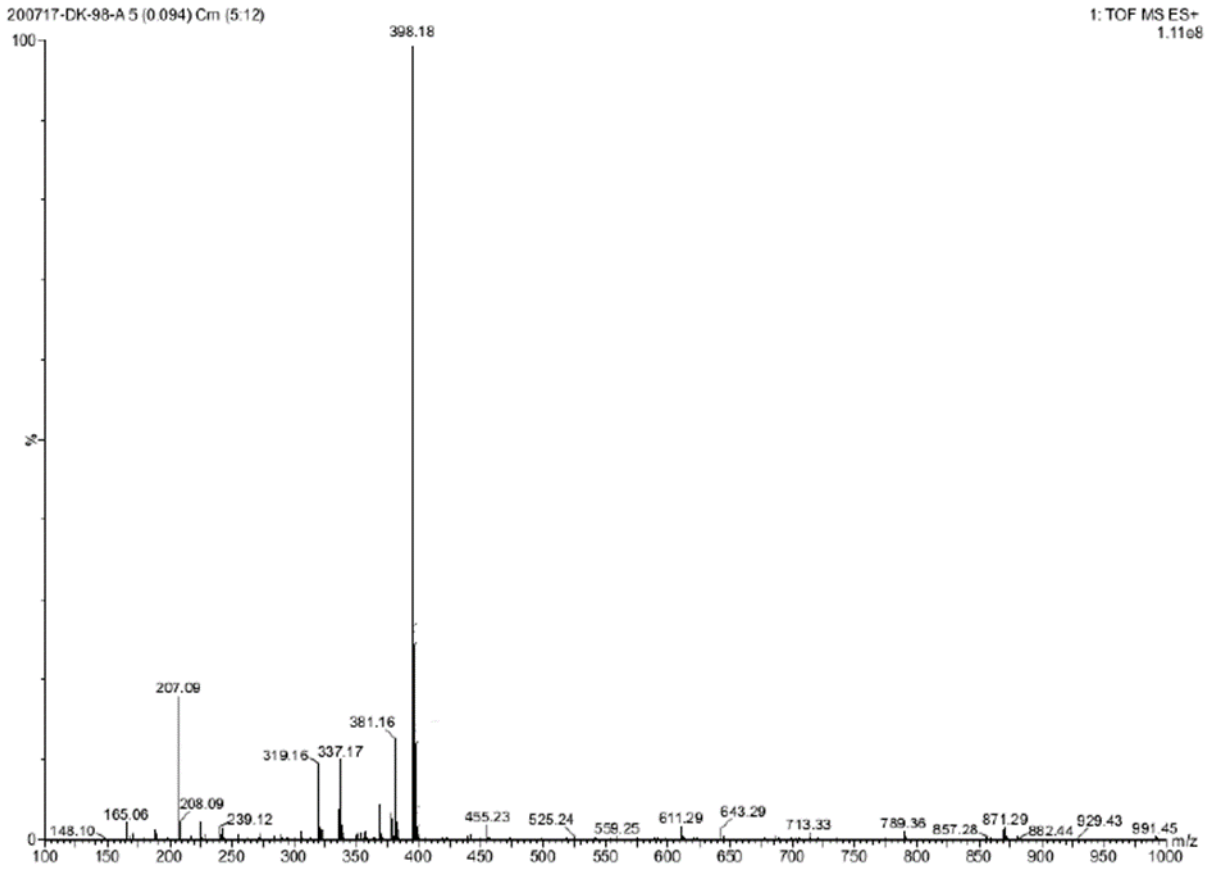

Figure S19: Massspectrum of compound **3a**.

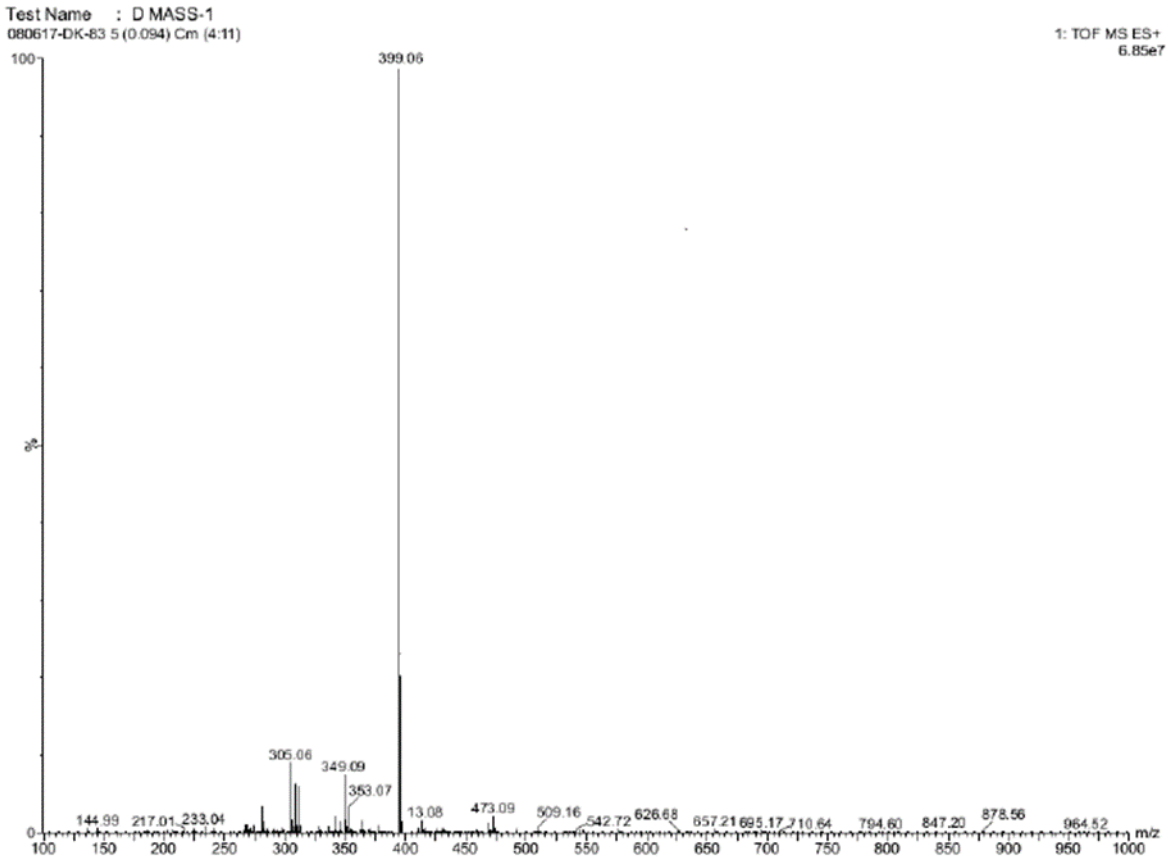

Figure S20: Massspectrum of compound **3b**.

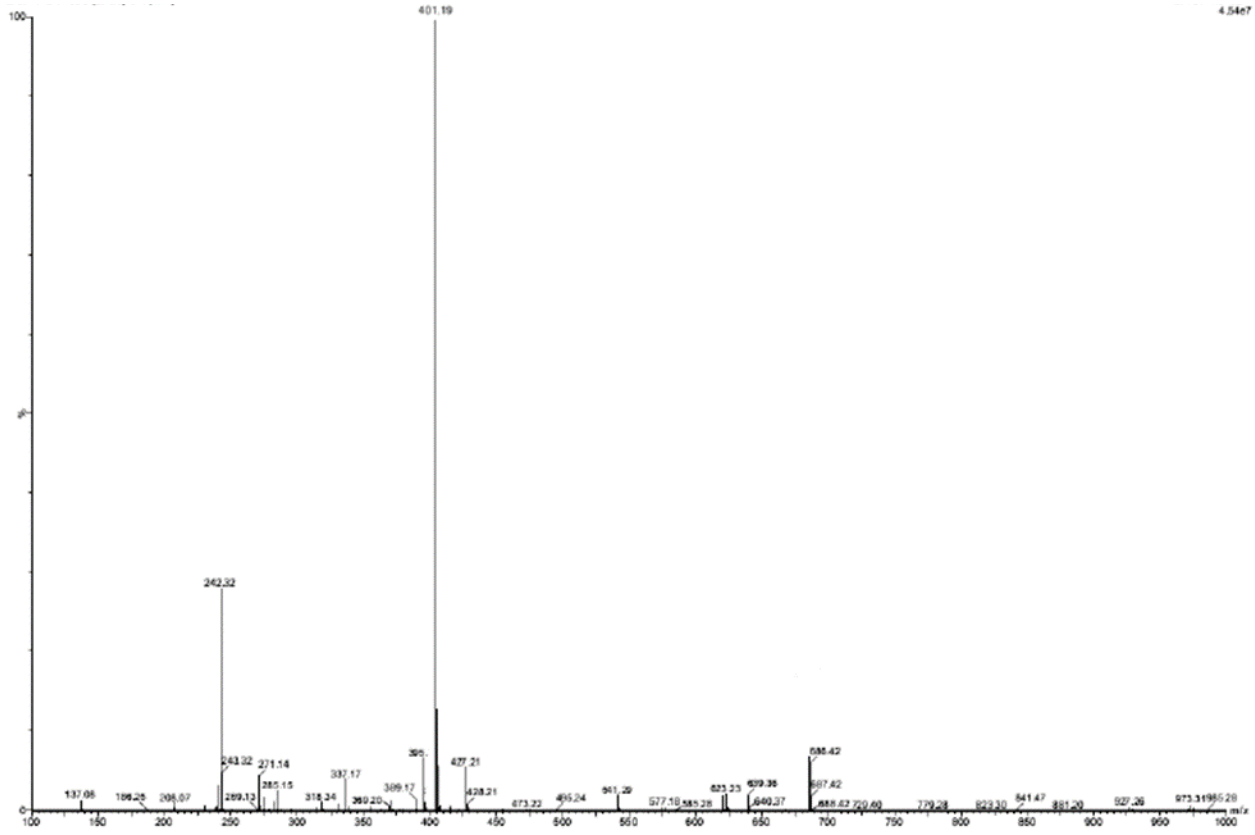

Figure S21: Massspectrum of compound **IL-1a**.

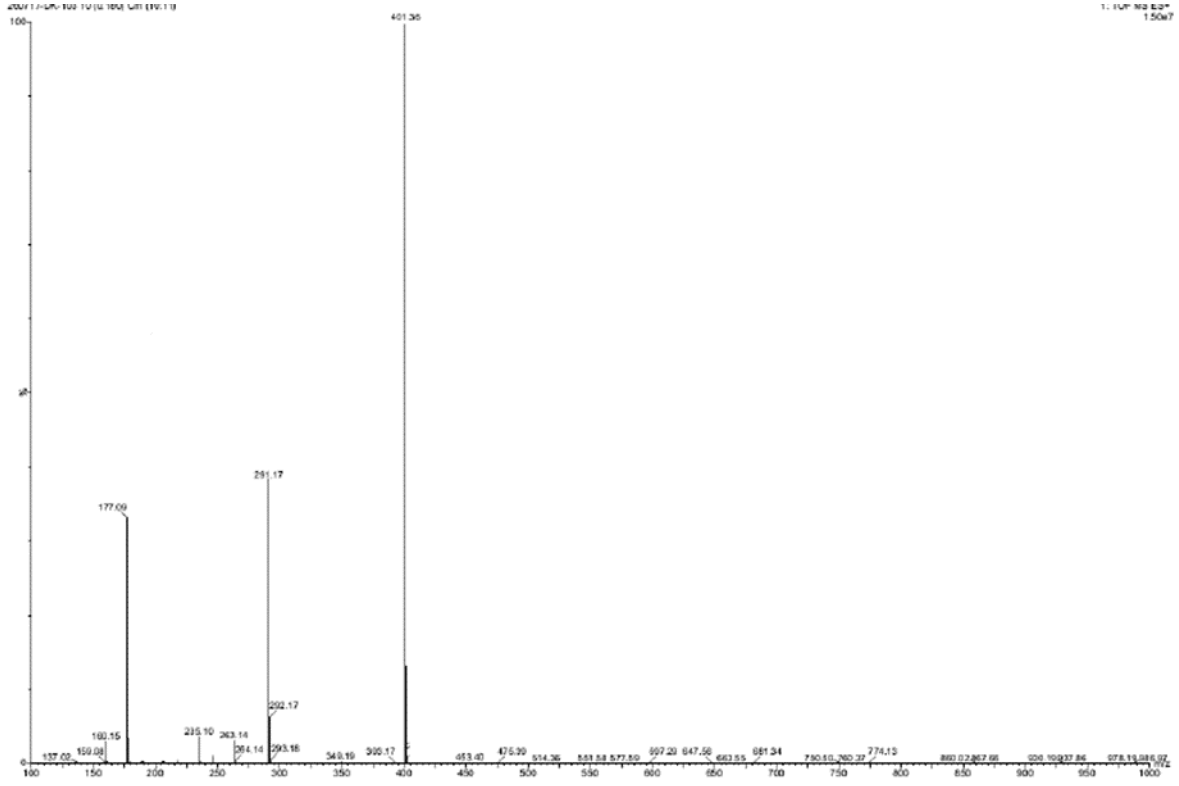

Figure S22: Massspectrum of compound **IL-1b**.