Electronic Supplementary Material

Functionalization of Graphene Quantum Dots with Rhamnolipid Produced from Bioconversion of Palm Kernel Oil by *Pseudomonas stutzeri* BK-AB12MT

Samuel Ivan[1], Fera Faridatul Habibah[1], Atthar Luqman Ivansyah[2], Rukman Hertadi[1] (✉)

[1] *Biochemistry Research Division, Chemistry Department, Bandung Institute of Technology, Bandung 40132, Indonesia*
[2] *Analytical Chemistry Research Division, Chemistry Department, Bandung Institute of Technology, Bandung 40132, Indonesia*
[†] *Present address: Department, University, City and Postcode, Country*

INFORMATION ABOUT ELECTRONIC SUPPLEMENTARY MATERIAL. The font is Minion Pro 9.5. Electronic supplementary material (ESM) may include large artwork, lengthy descriptions, and extensive data. Each supporting information artwork, description, and data file should be referred to in the manuscript at least once. The format is "Fig. S1 in the Electronic Supplementary Material (ESM)", or "Figure S2 in the ESM" at the beginning of a sentence. A brief description of the ESM should be included in the main text, before the references section, in a paragraph entitled "Electronic Supplementary Material:". ESM should be submitted with the manuscript and will be sent to referees during peer review. Authors should ensure that it is clearly presented.

Experimental Design and Data for RSM analysis
The experimental design is provided in **Table S-1**. The oil spreading diameter is used as response of optimization using RSM.

Table S-1 Experimental design for rhamnolipid production using RSM

Run	PKO Concentration (%(v/v))	Urea Concentration (%(w/v))	Incubation Time (hours)	Oil Spreading Diameter (cm)
1	15	0.3	16	3.40 ± 0.53
2	15	0.1	32	2.07 ± 0.31
3	15	0.3	32	1.80 ± 0.17
4	15	0.1	16	2.50 ± 0.50
5	5	0.3	16	1.57 ± 0.71
6	5	0.1	32	2.33 ± 0.59
7	5	0.3	32	2.10 ± 0.46
8	5	0.1	16	1.30 ± 0.10
9	10	0.2	24	3.77 ± 0.49
10	10	0.2	24	3.57 ± 0.90
11	10	0.2	24	5.20 ± 0.98
12	18.409	0.2	24	1.10 ± 0.52
13	1.591	0.2	24	0.73 ± 0.06
14	10	0.368	24	1.17 ± 0.29
15	10	0.032	24	0.60 ± 0.17
16	10	0.2	37.454	1.33 ± 0.42
17	10	0.2	10.546	2.30 ± 0.56
18	10	0.2	24	5.20 ± 1.04
19	10	0.2	24	4.00 ± 0.40
20	10	0.2	24	3.67 ± 1.30

Analysis of Variance (ANOVA) for RSM Results

To evaluate the RSM results, we provide ANOVA (shown in **Table S-2**).

Table S-2 Analysis of variance (ANOVA) results of the model

	Degrees of Freedom	Sum Squares	Mean Square	F-value	p-value
Block	1	1.0405	1.0405	1.9755	0.1934382
First Order	3	1.2176	0.4059	0.7706	0.5390474
Two-Way Interaction	3	2.0031	0.6677	1.2677	0.3427406
Pure Quadratic	3	27.8100	9.2700	17.5991	0.0004168
Residuals	9	4.7406	0.5267		
Lack of Fit	5	1.8634	0.3727	0.5181	0.7561554
Pure Error	4	2.8772	0.7193		