

Loading Effects of Aminoclays in Co-Culture of Two Cyanobacterial *Microcystis* and *Anabaena* Species as an Algicidal Role

Minh Kim Nguyen ^{1,2}, Vu Khac Hoang Bui ¹, Chi-Yong Ahn ^{3,4}, Hee-Mock Oh ^{3,4}, Jin-Soo Koh ¹, Ju-Young Moon ⁵ and Young-Chul Lee ^{1,*}

¹ Department of BioNano Technology, Gachon University, 1342 Seongnamdaero, Sujeong-gu, Seongnam-si 13120, Gyeonggi-do, Korea; kimminhndn@gmail.com (M.K.N.); hoangvu210190@gmail.com (V.K.H.B.); jinsoo3645_@naver.com (J.-S.K.)

² Department of Chemical Engineering – Environment, The University of Danang, University of Technology and Education, 48 Cao Thang St., Hai Chau Dist., Danang City 550000, Viet Nam

³ Cell Factory Research Center, Korea Research Institute of Bioscience and Biotechnology, 125 Gwahak-ro, Daejeon 34141, Korea; cyahn@kribb.re.kr (C.-Y.A.); heemock@kribb.re.kr (H.-M.O.)

⁴ Green Chemistry and Environmental Biotechnology, University of Science and Technology, 217 Gajeong-ro, Daejeon 34113, Korea

⁵ Department of Beauty Design Management, Hansung University, 116 Samseongyoro-16gil, Seoul 02876, Korea; bora7033@naver.com (J.-Y.M.)

* Correspondence: dreamdb@gachon.ac.kr; Tel.: +82-31-750-8751; Fax.: +82-31-755-7405

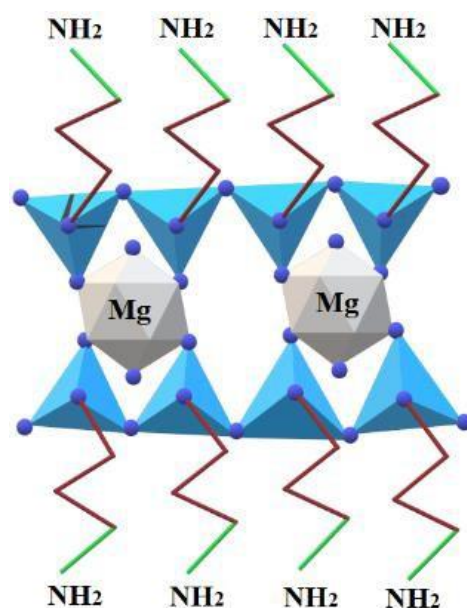


Figure S1. Ideal three-dimensional structure of MgAC, reproduced with the permission from reference (Yang *et al.*, 2014).



Figure S2. Optical microscope images of cell lysis of *Microcystis* sp. KW due to AC (0.1 g/L) loading. It is noted that the white bars are 10 μm scale.

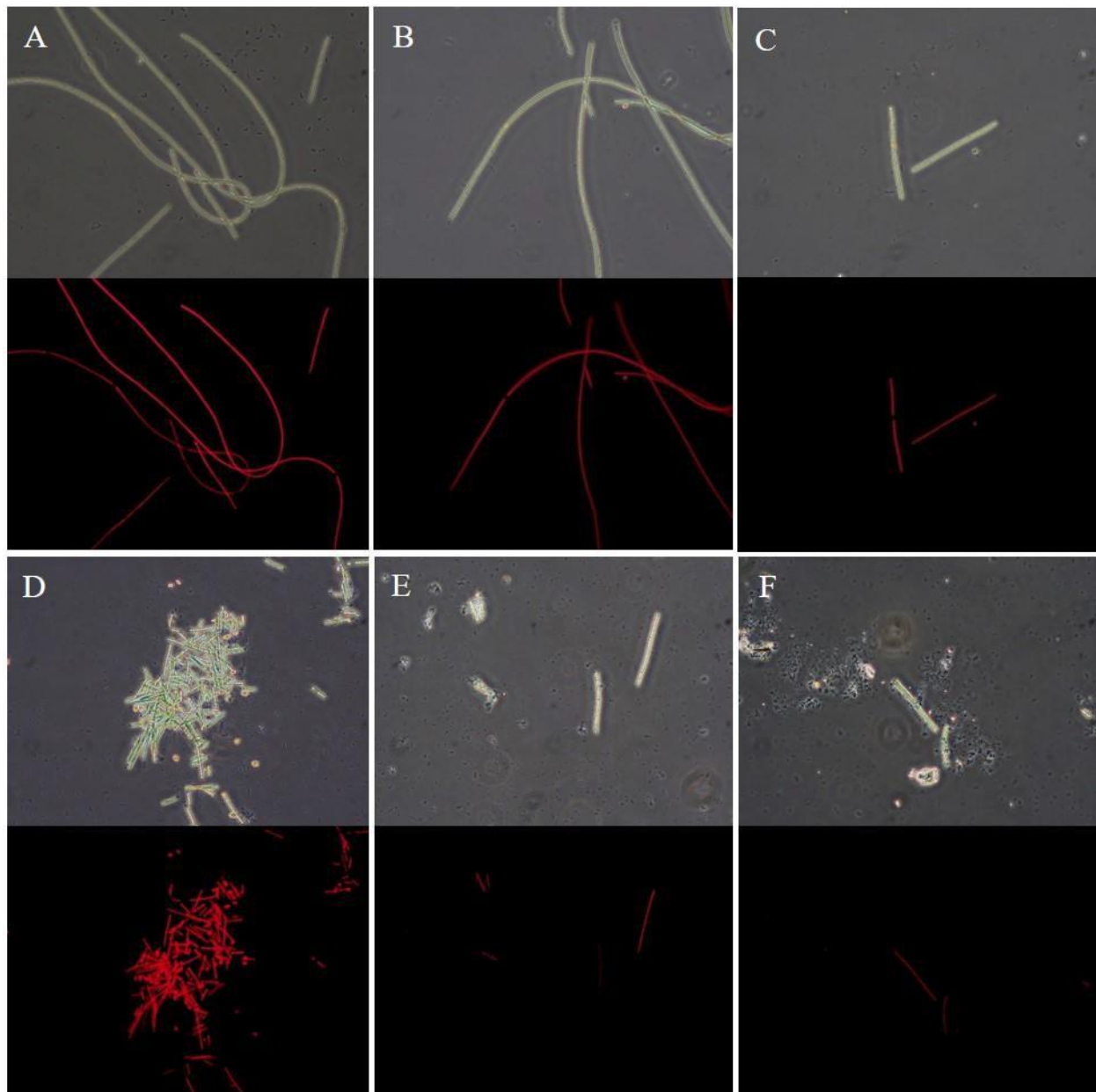


Figure S3. Optical microscope and fluorescent images of cell lysis of *Anabaena* sp. KVSF7 due to aminoclay (0.1 g/L) loading after (A) 0 day; (B) 2 days; (C) 4 days; (D) 6 days; (E) 8 days; (F) 10 days. It is noted that the white bars are 10 μm scale.

Table S1. Mono-culture and co-culture experimental designs of two cyanobacterial *Microcystis* and *Anabaena* species.

| Run | Treatment | Strains | MgAC | CaAC | AlAC |
|-----|-------------|--------------|------|------|------|
| 1 | Controls | M.S | - | - | - |
| 2 | | A.S. | - | - | - |
| 3 | | M.S | + | - | - |
| 4 | | A.S. | + | - | - |
| 5 | Co-cultures | M.S and A.S. | ++ | - | - |
| 6 | | | - | ++ | - |
| 7 | | | - | - | ++ |

M.A. represents *Microcystis* sp. KW. A.S. represents *Anabaena* sp. KVSF7. “+” means the experiment involves the type of AC, “-” means the experiment does not involve the type of AC. “*” means that the AC doses are 0.01, 0.02, 0.05, 0.1, 0.5, and 1.0 g/L. “**” means that the AC doses are 0.01, 0.05, 0.1, 0.5, and 1.0 g/L.

Table S2. Experimental designs to test the effect of *Microcystis* sp. KW cell free medium (MSCFM*) and CaAC on *Anabaena* sp. KVSF7.

| Run | Treatment | Strains | Medium |
|-----|------------|---------|--------------------------|
| 1 | Control | A.S. | BG11 |
| 2 | Treatments | A.S. | MSCFM + 0.01 g/L CaAC |
| 3 | | A.S. | MSCFM + 0.05 g/L CaAC |
| 4 | | A.S. | MSCFM + 0.1 g/L CaAC |
| 5 | | A.S. | MSCFM + 0.25 g/L CaAC |
| 6 | | A.S. | MSCFM + 0.5 g/L CaAC |