

Supporting Information for

## **Multicolor-Raman Analysis of Korean Paintworks: Emission-like Raman Collection Efficiency**

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Figure S1. (a) sectional image of of Yang-cheong (I) and (b) all pigment thickness on wood board.

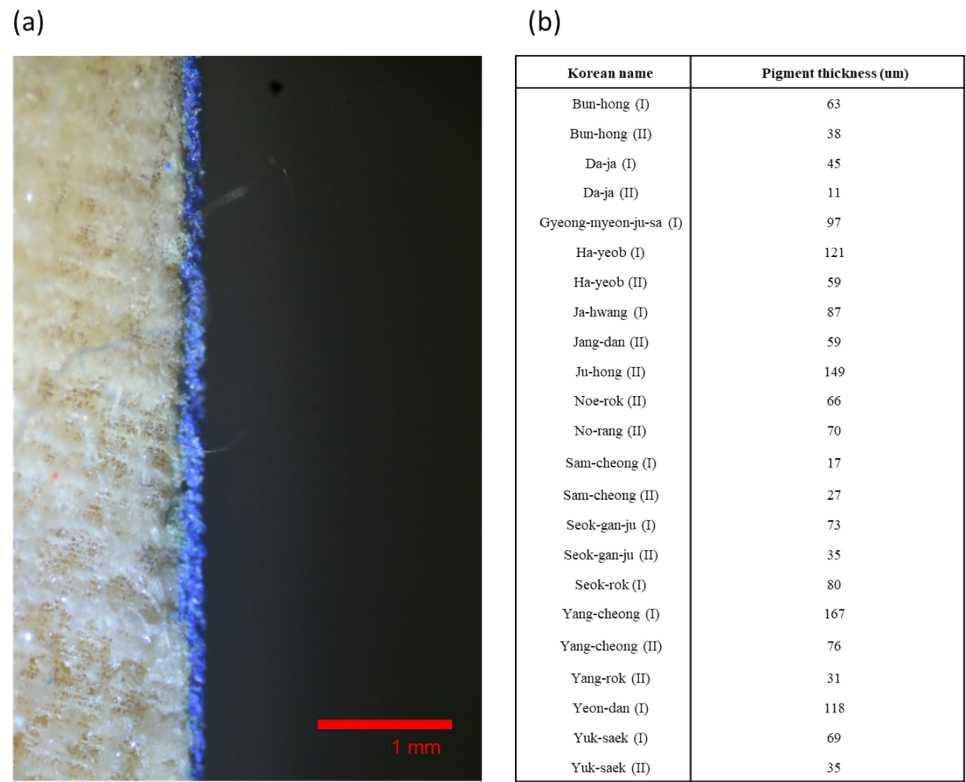


Figure S2. (a) beam profile image of 488 nm laser and (b) all diameter and are of laser.

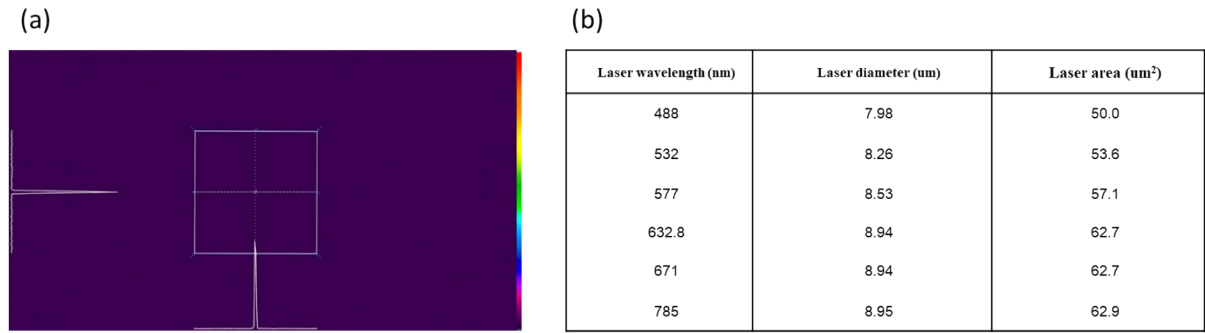


Figure S3. (a) optical image of wood board with animal glue and (b) Raman background.

(a)



(b)

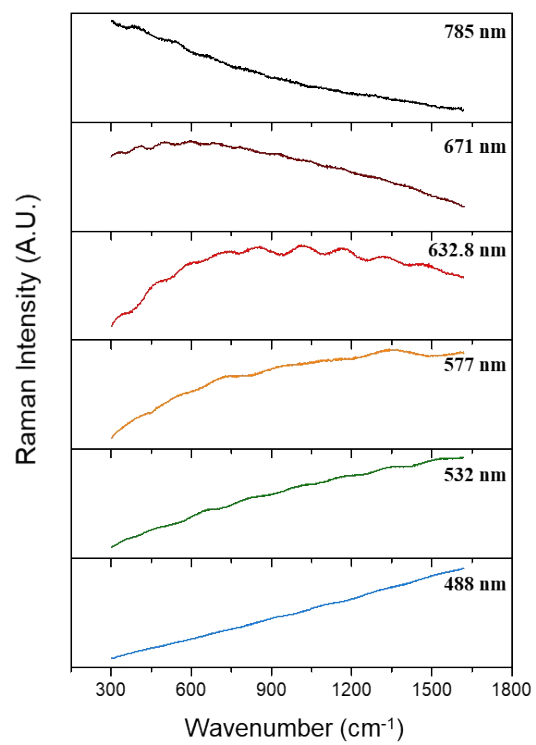


Figure S4. Ratio of Raman intensity according to vibration mode. The ratio was calculated by dividing by the Raman signal of the 488 nm excitation laser.

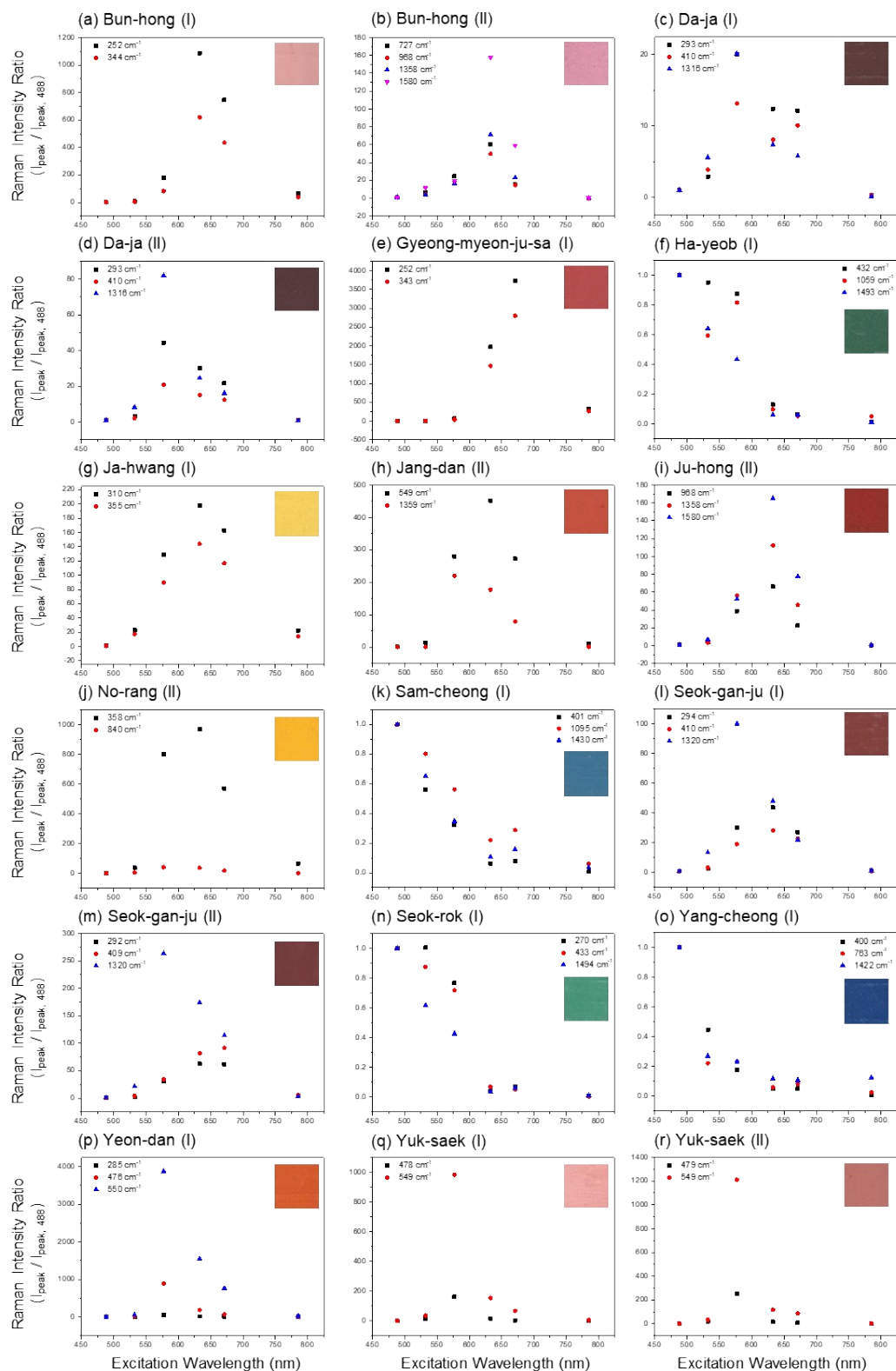
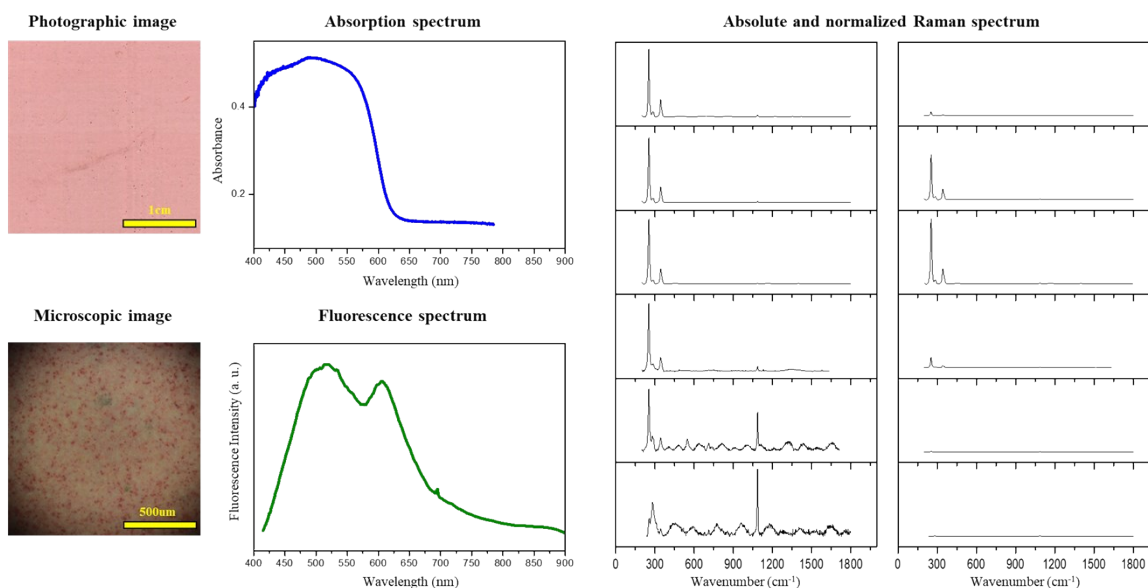
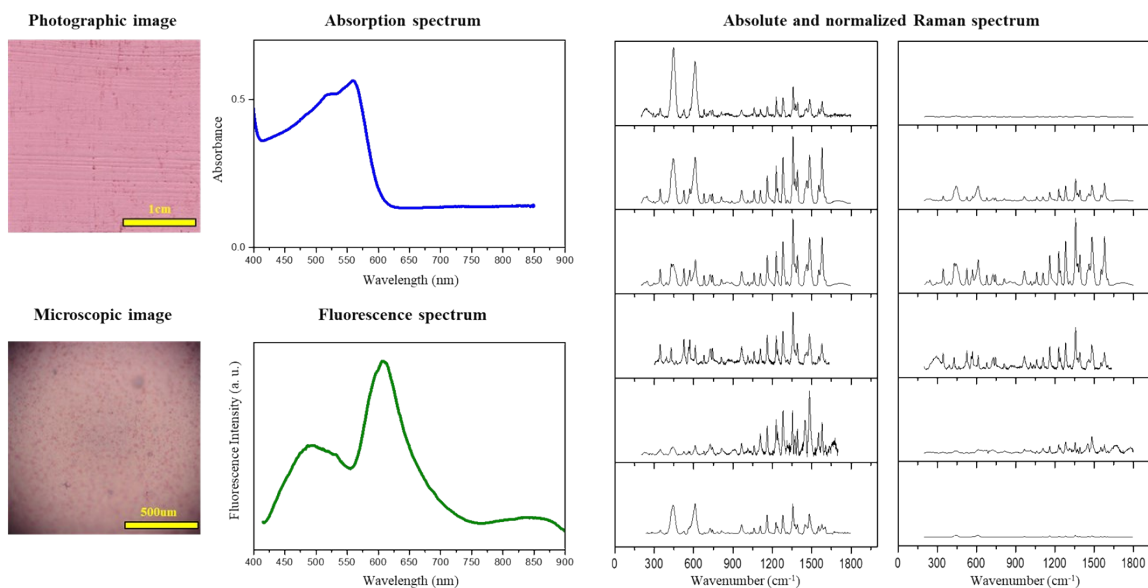


Figure S5. Photographic, microscopic image, absorption, fluorescence and Raman spectra of All the Dancheong pigments.

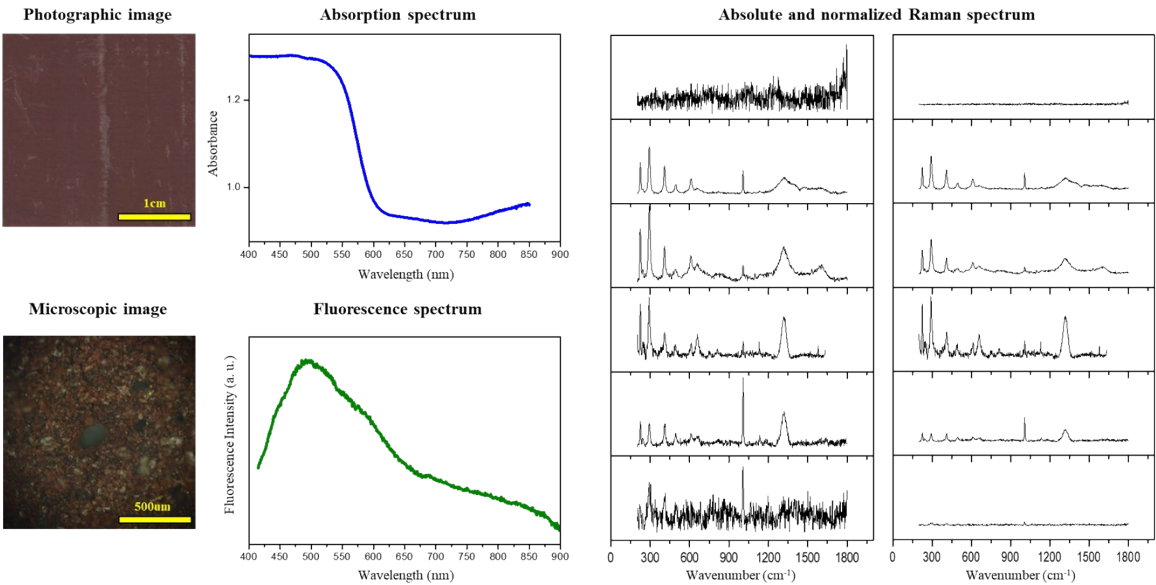
**Bun-hong (I), Cinnabar + Oyster shell white,  $\text{HgS} + \text{CaCO}_3$  (N4)**



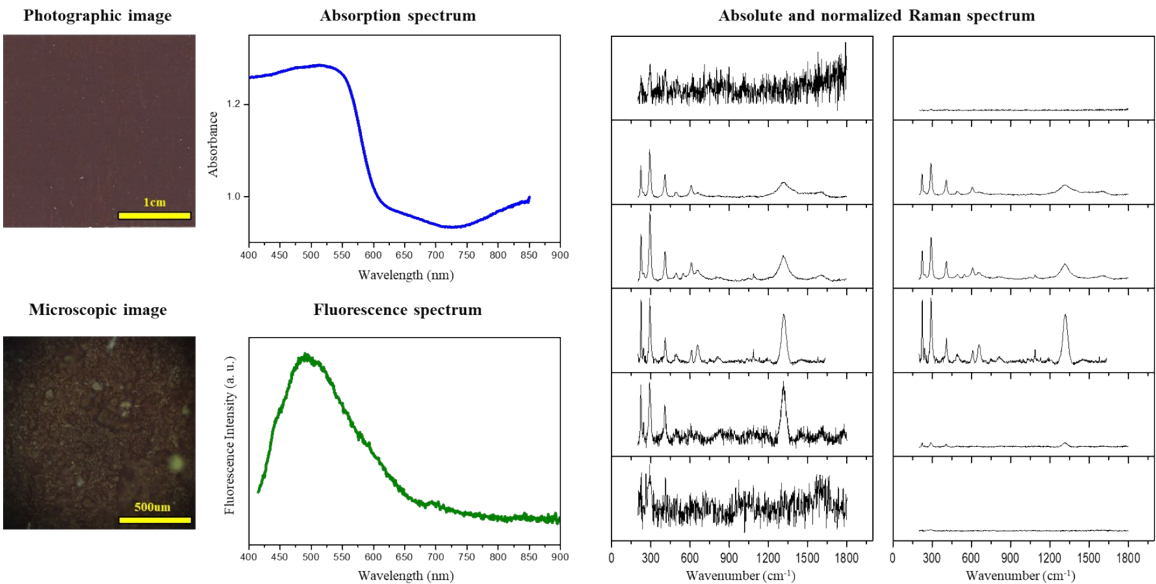
**Bun-hong (II), PR 112 + Titanium white,  $\text{C}_{24}\text{H}_{16}\text{Cl}_3\text{N}_3\text{O}_2 + \text{TiO}_2$  (C4)**



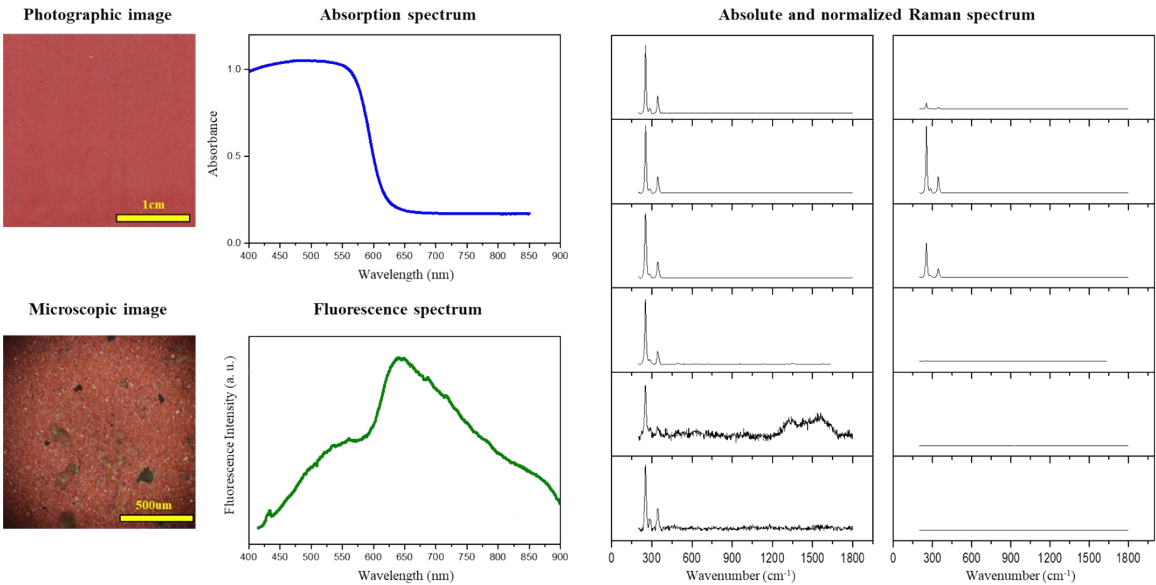
**Da-ja (I), Iron oxide red + Chinese ink,  $\text{Fe}_2\text{O}_3 + \text{C}$  (N13)**



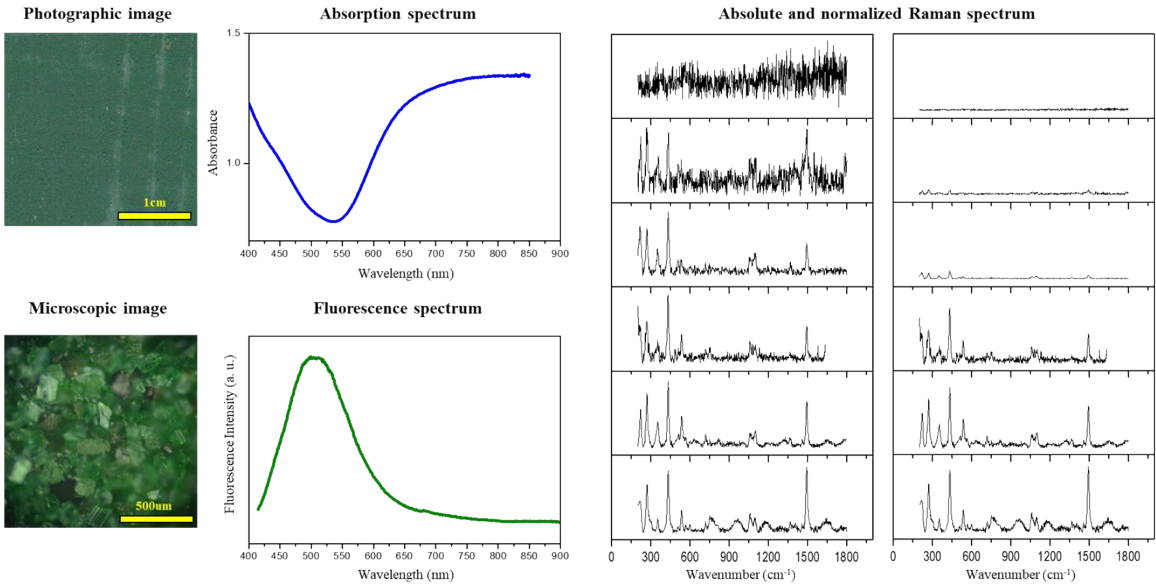
**Da-ja (II), Iron oxide red + Carbon black,  $\text{Fe}_2\text{O}_3 + \text{C}$  (C13)**



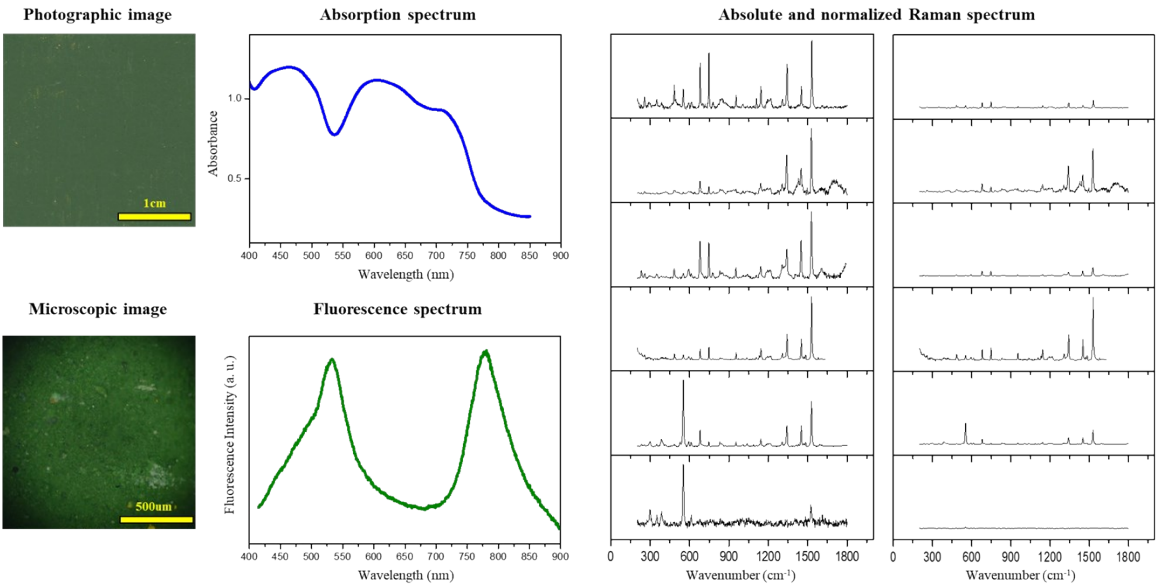
Gyeong-myeon-ju-sa (I), Cinnabar, HgS (N3)



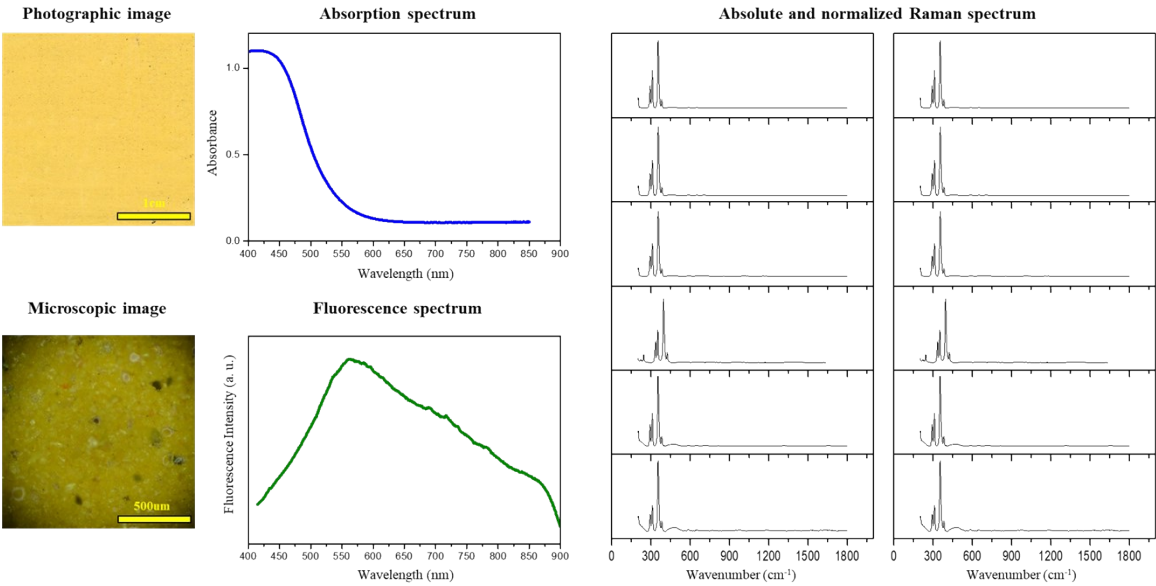
Ha-yeob (I), Malachite, Cu<sub>2</sub>CO<sub>3</sub>(OH)<sub>2</sub> (N9)



Ha-yeob (II), Phthalocyanine blue + Chrome oxide green,  $C_{32}H_{16}CuN_8 + Cr_2O_3$  (C9)

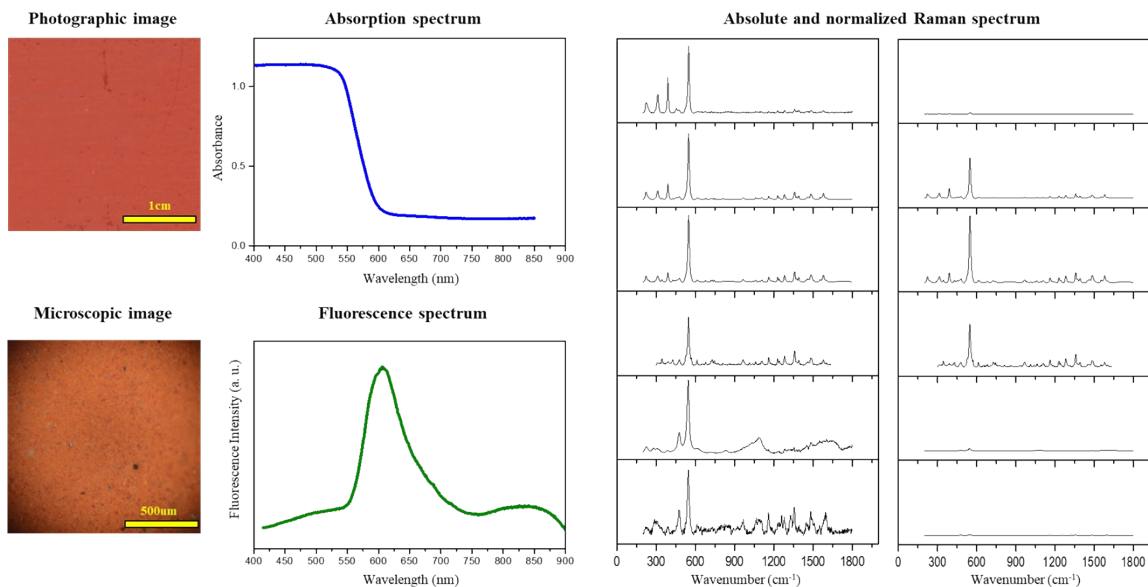


Ja-hwang (I), Orpiment,  $As_2S_3$  (N7)

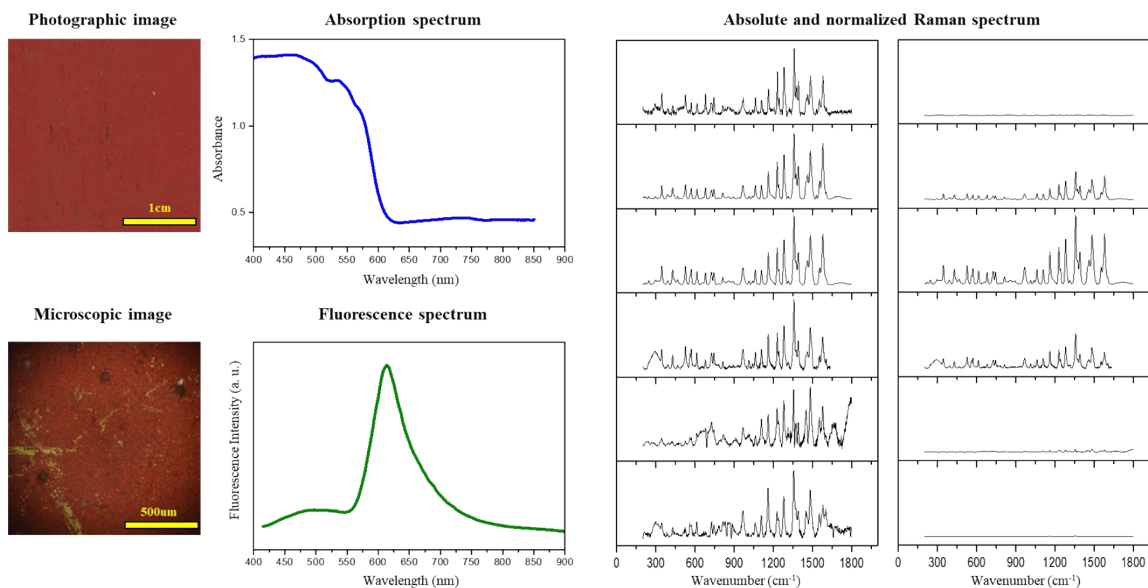




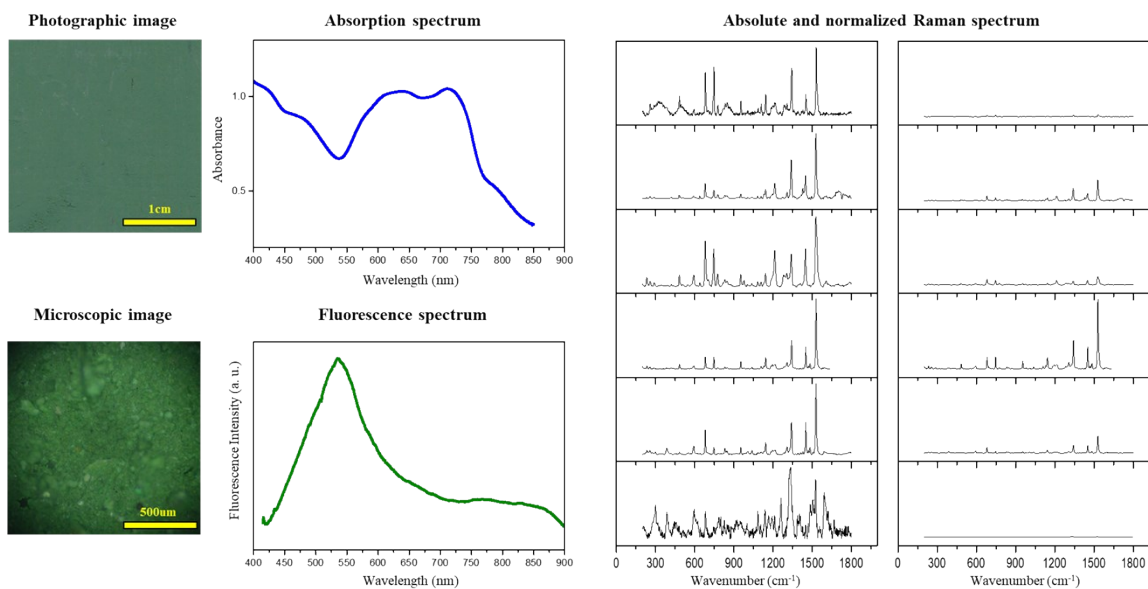
**Jang-dan (II), Red lead,  $\text{Pb}_3\text{O}_4$  (C5)**



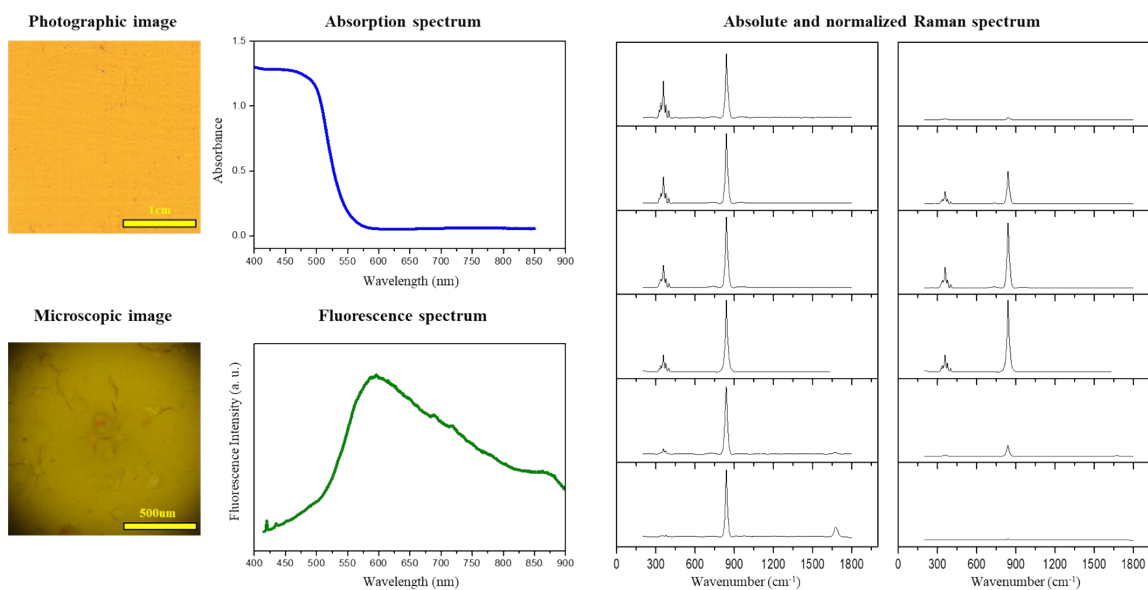
**Ju-hong (II), PR 112,  $\text{C}_{24}\text{H}_{16}\text{Cl}_3\text{N}_3\text{O}_2$  (C3)**



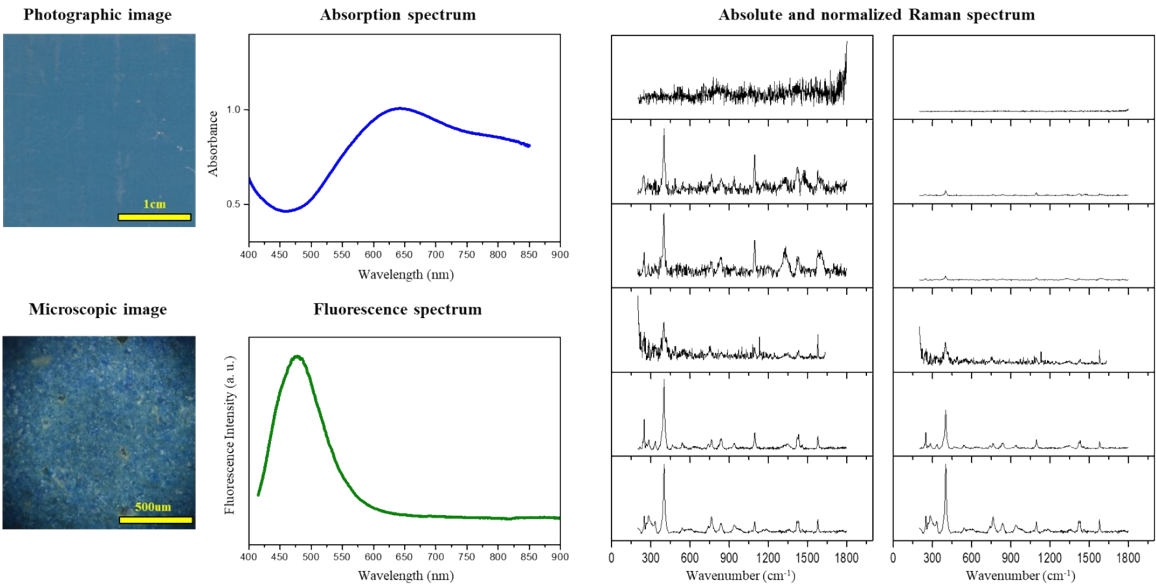
**Noe-rok (II), Phthalocyanine blue,  $C_{32}H_{16}CuN_8$  (C8)**



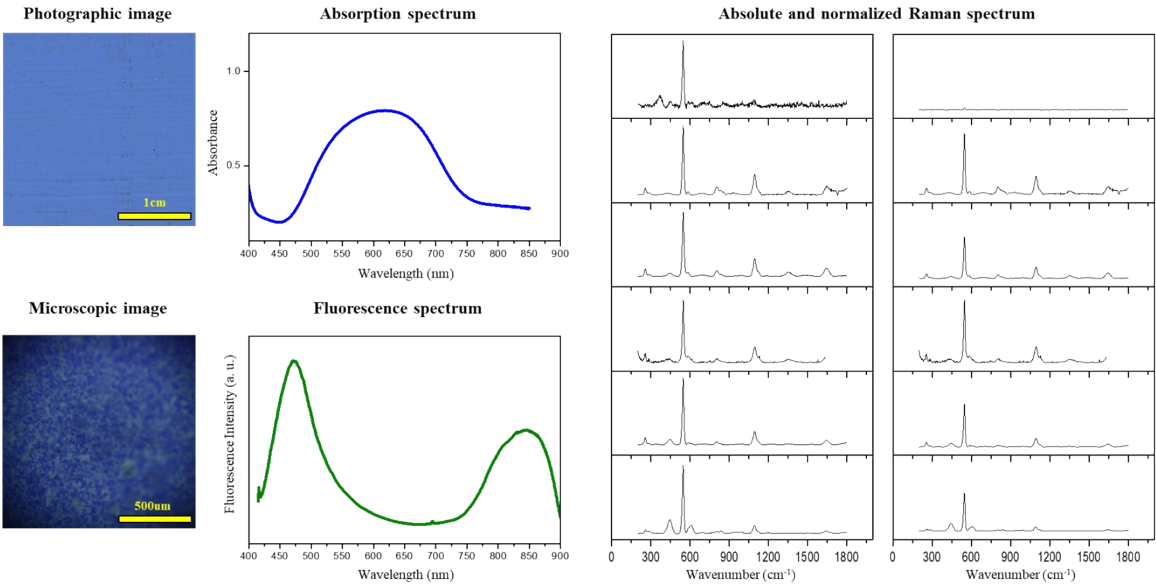
**No-rang (II), Chrome yellow,  $PbCrO_4$  (C7)**



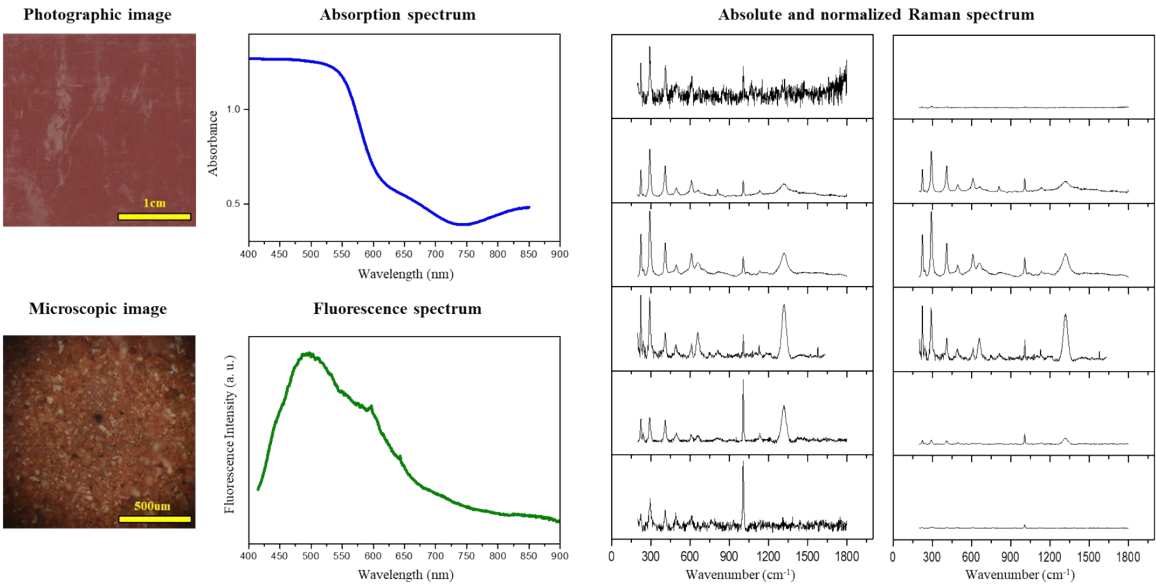
Sam-cheong (I), Azurite,  $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$  (N12)



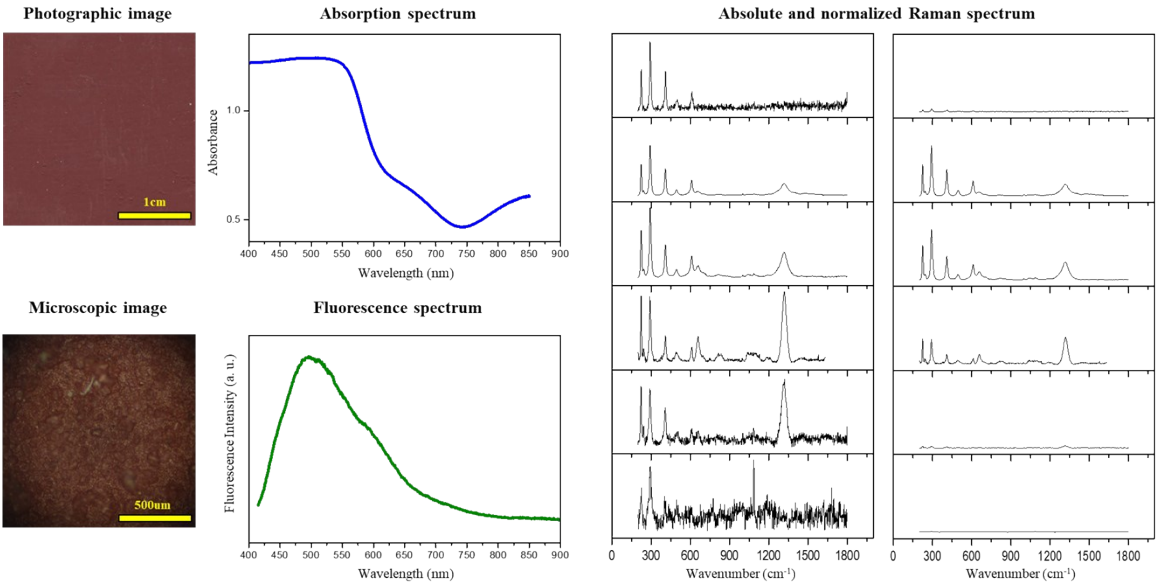
Sam-cheong (II), Lazurite + Titanium white,  $(\text{Na,Ca})_8[(\text{S,Cl,SO}_4,\text{OH})_2](\text{Al}_6\text{Si}_6\text{O}_{24}) + \text{TiO}_2$  (C12)



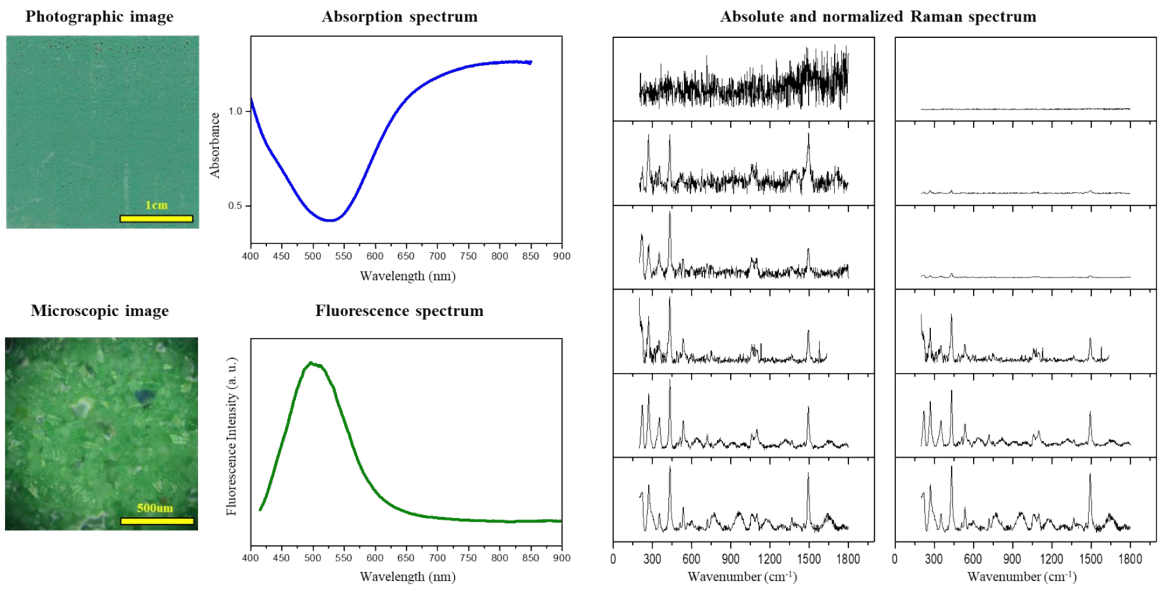
Seok-gan-ju (I), Iron oxide red + anhydrite,  $\text{Fe}_2\text{O}_3$  +  $\text{CaSO}_4$  (N14)



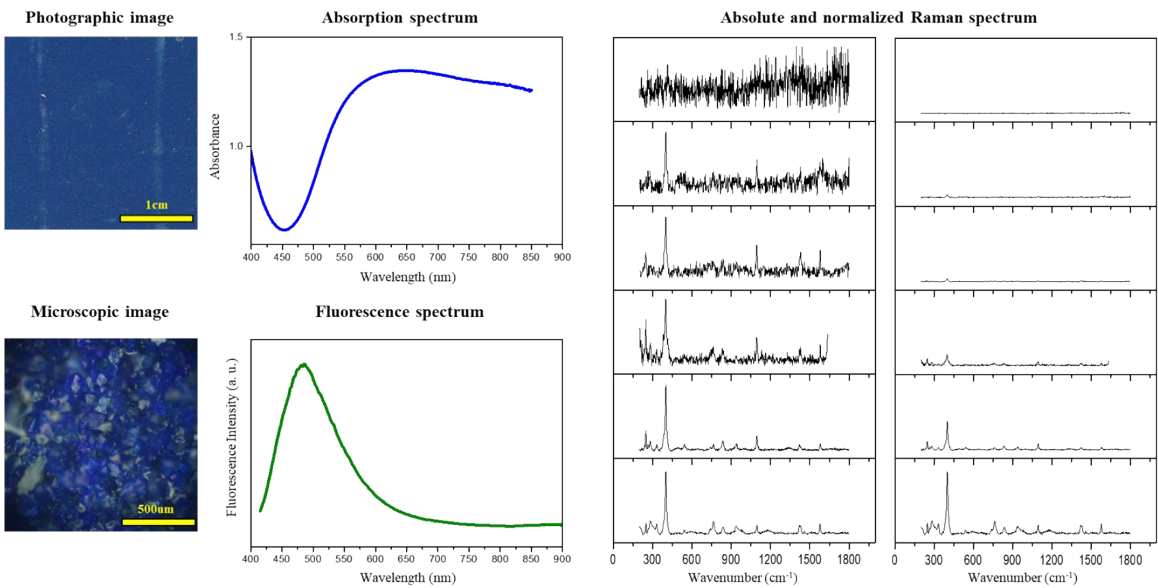
Seok-gan-ju (II), Iron oxide red,  $\text{Fe}_2\text{O}_3$  (C14)



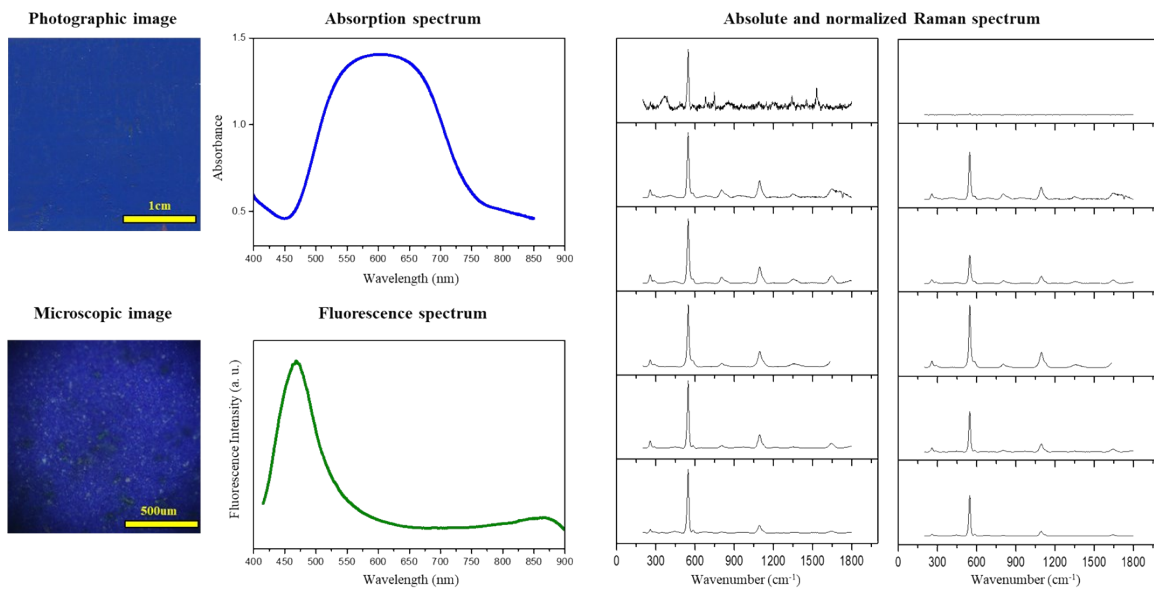
**Seok-rok (I), Malachite,  $\text{Cu}_2\text{CO}_3(\text{OH})_2$  (N10)**



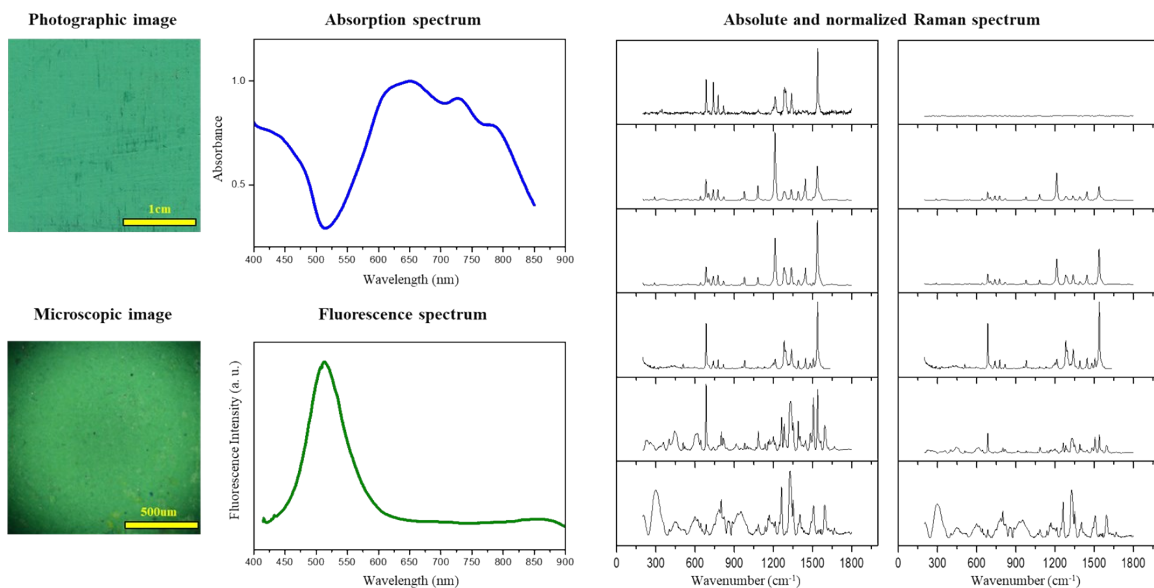
**Yang-cheong (I), Azurite,  $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$  (N11)**



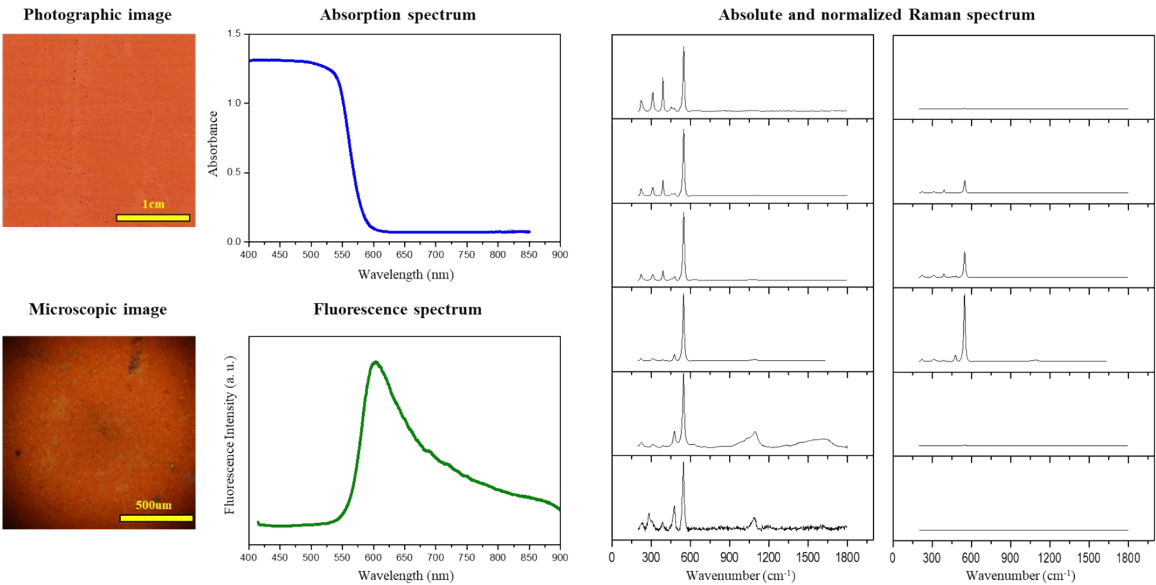
**Yang-cheong (II), Lazurite,  $(\text{Na,Ca})_8[(\text{S,Cl,SO}_4,\text{OH})_2](\text{Al}_6\text{Si}_6\text{O}_{24})$  (C11)**



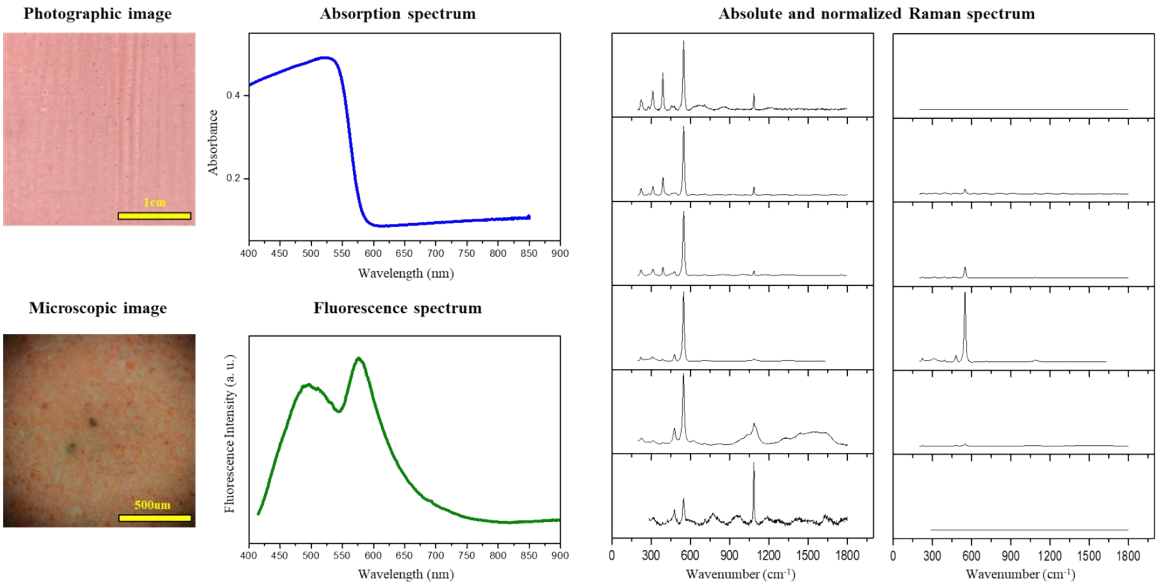
**Yang-rok (II), Phthalocyanine green,  $\text{C}_{32}\text{Cl}_{16}\text{CuN}_8$  (C10)**



**Yeon-dan (I), Red lead,  $\text{Pb}_3\text{O}_4$  (N5)**



**Yuk-saek (I), Red lead + Oyster shell white,  $\text{Pb}_3\text{O}_4 + \text{CaCO}_3$  (N6)**



Yuk-saek (II), Red lead + Titanium white,  $\text{Pb}_3\text{O}_4 + \text{TiO}_2$  (C6)

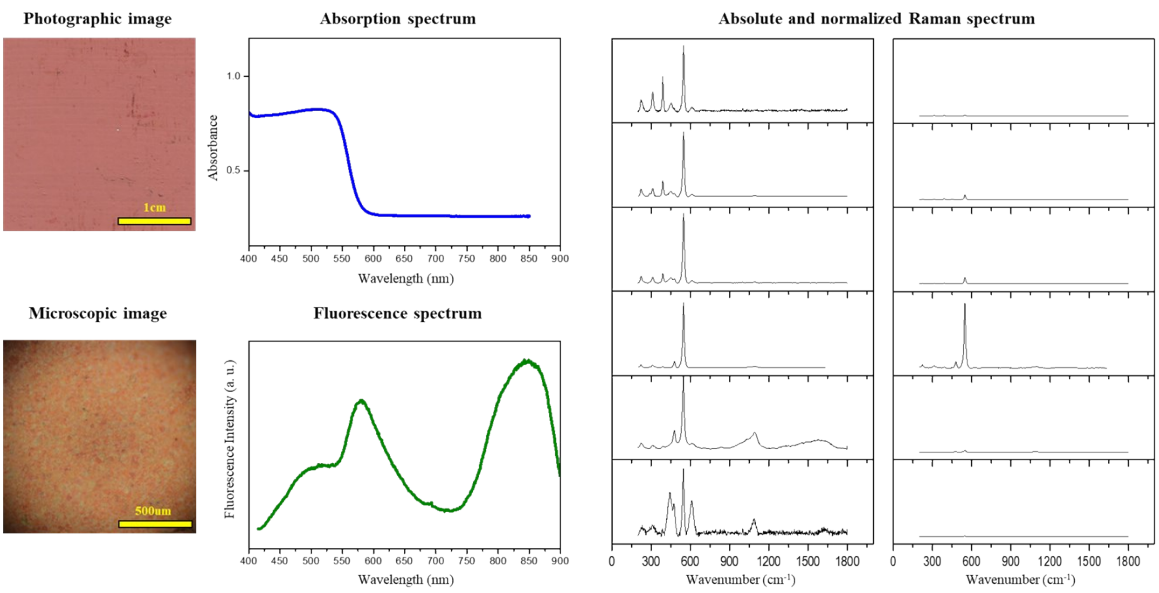




Figure S6. Fluorescence spectrum of both blues according to the laser excitation wavelength.

