Raman fingerprints of SARS-CoV-2 Omicron subvariants: molecular roots of virological characteristics and evolutionary directions

Giuseppe Pezzotti,^{a,b,c,d,e,f,g*} Eriko Ohgitani,^c Yuki Fujita,^a Hayata Imamura,^{a,e} Francesco Pappone,^h Alfio Grillo,^h Maiko Nakashio,ⁱ Masaharu Shin-Ya,^c Tetsuya Adachi,^{c,e,j} Toshiro Yamamoto,^e Narisato Kanamura,^e Elia Marin,^{a,e} Wenliang Zhu,^a Tohru Inaba,ⁱ Yoko Tanino,^k Yoko Nukui,^k Koichiro Higasa,¹ Yoshiki Yasukochi,¹ Kazu Okuma,^j and Osam Mazda^{c*}

^aCeramic Physics Laboratory, Kyoto Institute of Technology, Sakyo-ku, Matsugasaki, Kyoto 606-8585, Japan; ^bDepartment of Molecular Genetics, Institute of Biomedical Science, Kansai Medical University, 2-5-1 Shinmachi, Hirakata, Osaka 573-1010, Japan; ^cDepartment of Immunology, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kamigyo-ku, 465 Kajii-cho, Kyoto 602-8566, Japan; ^dDepartment of Orthopedic Surgery, Tokyo Medical University, 6-7-1 Nishi-Shinjuku, Shinjuku-ku, 160-0023 Tokyo, Japan; ^eDepartment of Dental Medicine, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kamigyo-ku, Kyoto 602-8566, Japan; ^fDepartment of Molecular Science and Nanosystems, Ca' Foscari University of Venice, Via Torino 155, 30172 Venice, Italy; ^gDepartment of Applied Science and Technology, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italy; ^hDepartment of Mathematical Science, *Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italy; ⁱDepartment* of Infection Control & Laboratory Medicine, Kyoto Prefectural University of Medicine, Kamigyo-ku, 465 Kajii-cho, Kyoto 602-8566, Japan; ^jDepartment of Microbiology, Kansai Medical University, School of Medicine, 2-5-1 Shinmachi, Hirakata, 573-1010 Osaka Prefecture, Japan ^kDepartment of Clinical Laboratory, University Hospital, Kyoto Prefectural University of Medicine, Kamigyo-ku, 465 Kajii-cho, Kyoto 602-8566, Japan; ¹Genome Analysis, Institute of Biomedical Science, Kansai Medical University, 2-3-1 Shin-machi, Hirakata, Osaka, 573-1191, Japan.

^{*}Correspondence: Giuseppe Pezzotti: <u>pezzotti@kit.ac.jp;</u> Osam Mazda: <u>mazda@koto.kpu-m.ac.jp</u>

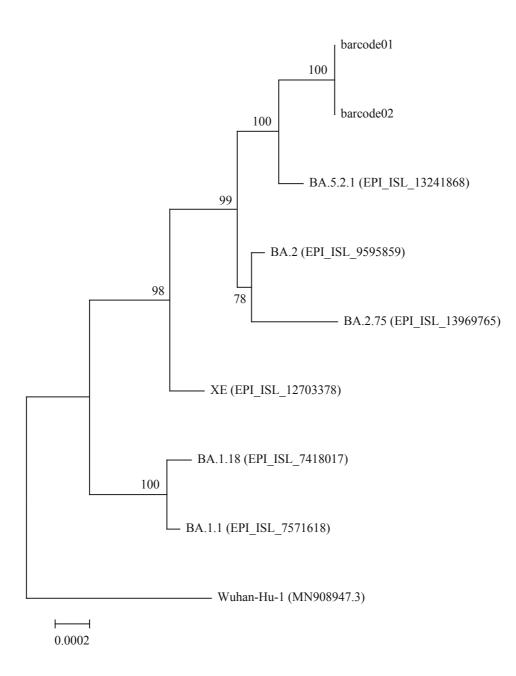


Figure S1: The maximum likelihood (ML) tree of SARS-CoV-2 whole genome sequences. Numbers in parentheses are GISAD or GenBank accession numbers. The Hasegawa-Kishino-Yano model with gamma-distributed rate variation across site was used as a distance measure. The internal node number represents boostrap values (1000 replications). A SARS-CoV-2 reference genome sequence (Wuhan-Hu-1) was used as an outgroup. The ML tree analysis indicating that the genome sequences of the swab samples can be classified into BA.5.2.