Abstract Submitted
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Structure of interfacial water molecules under externally-applied electric field studied by vibrational sum−frequency generation TAKAHIRO KONDO, TSUYOHITO ITO, Osaka University — We report effects of electric field on the structure of water molecules in the CaF_2/water interfacial region by vibrational sum−frequency generation (VSFG) spectroscopy. VSFG gives molecular level information for several layers of molecules at the interface. At the CaF_2/water interface with low pH, the CaF_2 surface is known to be positively charged and form an electric double layer (EDL). Without externally applied electric field, the water molecules are aligned along the electric field inside the EDL (EF-EDL), with facing oxygen (oxygen-up) to CaF_2 surface. According to SFG peak at $\sim$3150 cm^{-1} attributed to vibration of highly-ordered water molecules, the orientation of water molecules becomes higher as the external electric field is applied to the same direction of the EF-EDL. In contrast, with the applied field in opposite direction of the EF-EDL, the SFG intensity becomes weak and almost zero. When the applied field is further increased, the SFG intensity becomes stronger with the applied field increasing. This increase suggests that the water molecules can be realigned (oxygen−down to CaF_2 surface) by externally-applied electric field. Details on the experimental results and discussions will be presented at the meeting.

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