Cyclo-addition reaction of Lewis acidic molecule; AlCl₃

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The study on the adsorption structure of Lewis acid molecule, AlCl₃, on the Ge(100) surface using scanning tunneling microscopy (STM), high-resolution core-level photoemission spectroscopy (HRPES) and density functional theory (DFT). The STM investigation reveals two adsorption configurations; on-top and bridge structures. The population of bridge configuration is 20 times greater than on-top structure, since the on-top structure forms a tetragon with Ge dimer, resulting in a relatively unstable structure with high strain. In both configurations, AlCl₃ molecules interact with two Ge-atoms via cyclo-addition-like adsorption mechanism. It is expected that the two adsorption configurations are formed by double-bond character of AlCl₃.