indicated that the second reduction process from CuCl to Cu(0) proceeded in the temperature range of 350 ± 15 ˚C. The X-ray absorbance at around 350 ˚C of the second run was largely deviated from that of the first run. The increase rate of temperature of the second run was much slower than that of the first run. It is thus considered that the delayed reduction in the first run is related to the relatively slow conversion of CuCl to Cu(0). This dynamic behavior of CuCl suggesting its thermodynamic stability also contrasts with the instability of Cu_2O, which is easily reduced.

4. Conclusion

The chemical state conversion of $CuCl_2$ on SiO_2 were analyzed using the *in-situ* XAFS method during the temperature-programmed reduction process under the He-diluted H_2 gas flow. This study clarified the temperature at which the stepwise reduction from $CuCl_2$ to metallic Cu via CuCl proceeds on SiO_2. It has been pointed out that the reduction temperatures of chlorides are identical to those of oxides, whereas there is a clear difference in the thermodynamic stability of the Cu(I) state.

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