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# Synthesis and physical properties of a assembled metal complex using tetraazamacrocycle Cu(Ⅱ) complex with tricarboxylic ligand

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**[Introduction]**

Recently, assembled metal complex with high porosity has received a lot of attention as inorganic material for its applications to adsorption and catalysis. In this study, we report the properties of a new assembled metal complex by use of *trans*-5,7,7, 12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane (tetraazamacrocycle) Cu(Ⅱ) complex with 4, 4', 4"-s-triazine-1, 3, 5-triyltri-*p*-aminobenzoate(TATAB).

**[Experiments]**

TATAB was synthesized according to the method of the previous literature.[i] A aqueous mixture of tetraazamacrocycle Cu(Ⅱ) complex and TATAB was added in autoclave and heated in electronic oven at 120 ℃ for 72 h. The purple crystals were collected and washed with DMF and $H_2O$. The product was identified by FT-IR, UV-vis and $^1H$ NMR. Several measurements such as thermal gravimetric analysis (TGA), magnetic susceptibility, powder X-ray diffraction (PXRD) and vapor exposure were carried out to investigate its physical properties. Furthermore, this complex is possible to adsorb metal ions due to amino groups in TATAB not involved in coordination with Cu(II), so metal adsorption experiments for $Ni^{2+}$ were carried out under various conditions.

**[Results]**

The chemical composition of a new assembled metal complex was determined as $Cu_3$(tetraazamacrocycle)$_2$(TATAB)$_1 \cdot 5.5H_2O$ by TGA. From the result of TGA, thermal stability has improved than existing tetraazamacrocycle complex. [ii]

In Fig.1., decrease of absorbance of $Ni^{2+}$ at 405 nm with time is shown. This fact indicates that the adsorption of $Ni^{2+}$ occurs. The details of these results will be discussed at the conference.

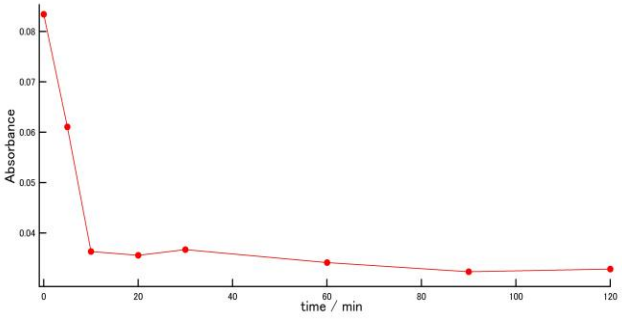


Fig.1. The time change of absorbance for $Ni^{2+}$ at 405 nm

[i] N. Zhang, Y.-H. Xing, F.Y. Bai, *Inorg. Chem*. **2019**, 58, 6866−6876.
[ii] K. Hosoda, Master's Thesis, Shinshu Univ., **2018**.