化学科講演会のお知らせ

講師：**Dr. Kevin Lemoine**

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講演題目：**Exploration of Iron-Based Fluoride Synthesis:**

Application as Positive Electrodes for Lithium-Ion Batteries

日時：**2025 年 11 月 7 日（金）16 時 30 分から 17 時 30 分頃まで**

場所：**南 7 号館 4 階セミナー室**

Lemoine 博士は学習院大学客員研究員（短期）として来日しており、この度、講演してくださることになりました。皆様、奮ってご参加ください。（次ページのアブストラクトをご覧ください。）

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Gakushuin University, Department of Chemistry *Friday November 7th 2025*

Exploration of Iron-Based Fluoride Synthesis: Application as Positive Electrodes for Lithium-Ion Batteries

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Over the past two decades, major advances have improved lithium-ion battery performance, yet further progress is needed to meet future energy storage demands. Fluorides, such as iron(III) fluoride (FeF_3), offer higher potentials than oxides due to fluorine's greater electronegativity, while iron remains abundant and non-toxic.[1] This work explores new iron-based fluorinated compounds as positive electrode materials through several strategies: a two-step synthesis to obtain hydroxyfluorides, high-pressure synthesis to explore new compounds, and the direct fluorination of hydroxides using F_2 gas.[2-4] The obtained materials are characterized structurally, with Mössbauer Spectrometry giving interesting and important local informations.[5] Also, electrochemical characterizations reveal promising first results, underscoring the potential of fluorides for sustainable, high-energy battery systems.

REFERENCES:

[1] K. Lemoine *et al*, Fluorinated materials as positive electrodes for LiBs and NiBs. *Chem. Rev.* **2022**, *122*, 14405-14439.

[2] K. Lemoine *et al*, Synthesis by Thermal Decomposition of Two Iron Hydroxyfluorides: Structural Effects of Li Insertion. *Chem. Mater.* **2019,** *31* (11), 4246-4257.

[3] K. Lemoine *et al*, High-pressure of trigonal $LiFe_2F_6$: new iron fluoride with Li^+ tunnels as potential cathode for lithium-ion batteries. *J. Phys. Chem.* C **2022**, *126*, 8248–8255.

[4] A. Rouag *et al*, intimately mixed copper, cobalt, and iron fluorides resulting from the insertion of fluorine into a LDH template. *Dalt. Trans.* **2024**, *17*, 7628-7640.

[5] K. Lemoine *et al*, Contribution of Mössbauer spectrometry to structural characterization of iron-based fluorinated materials. *J. Mat. Res.* **2023**, *38*, 1138–1148.