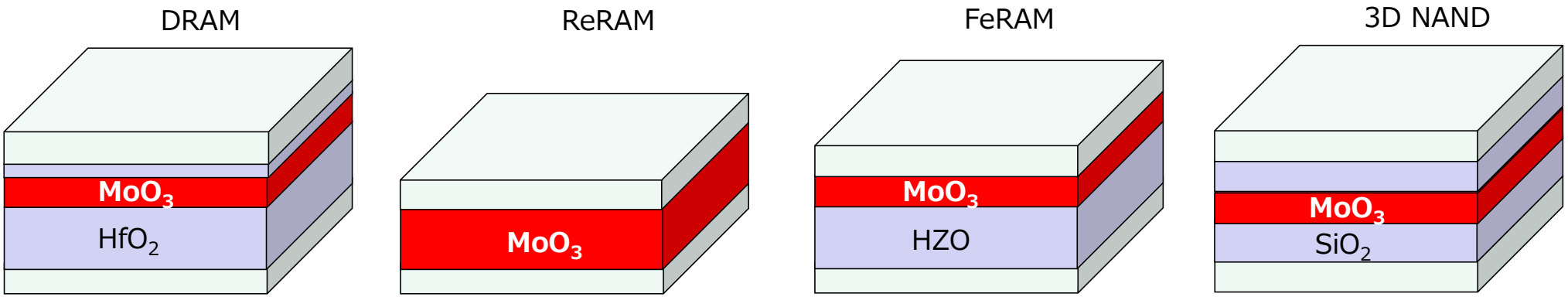
■ Development Project of "New Mo Precursors" Ver.3

Capacitor Technology Post-HfO_2 enable by the MoO_x Interface !



【The Potential of MoO_3】

- ◆ multivalued states（$Mo^{6+}/Mo^{5+}/Mo^{4+}$） ･･･ charge traps, resistance charges, multiple-level cell
- ◆ low oxygen vacancy formation energy ･･･ charge retention, switching, interface control
- ◆ high work function ･･･ improving band offset, suppressing electron injection, reducing leakage current

【Directions for Commercialization/Application】

- ◆ Memory Application（ReRAM, Neuromorphic Memory, Charge Trap Memory）
- ◆ Interface Control Layer / Oxygen Vacancy Control Layer for DRAM Capacitors

Proposal of a New Liquid Mo Precursor［TCMo-23］ capable of forming MoOx layer under a wide range of temperatures and reactor pressures !

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□ Target : MoO_x

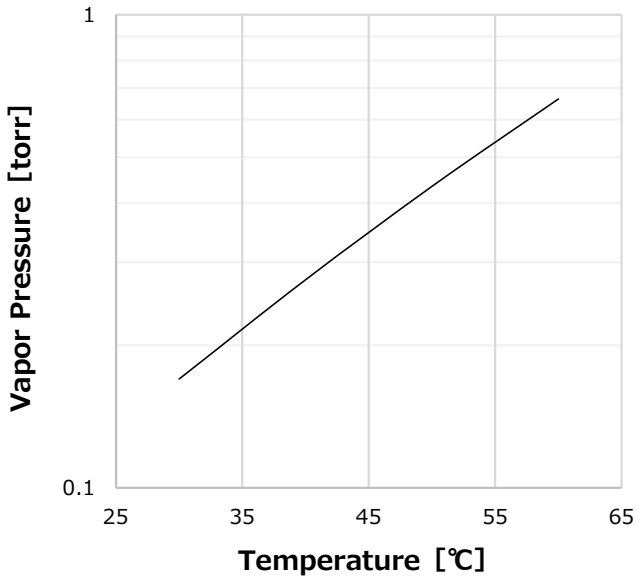
Code Name	TCMo-23
1) $TGA_{1/2}$ (℃)	165
Residual mass (%)	< 34%
2) DSC (℃)	187

1) TGA (Thermogravimetric Analysis) : Volatility property of precursor

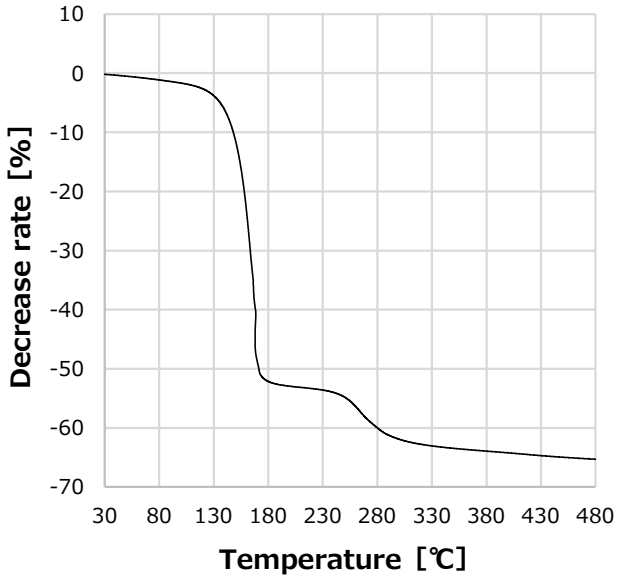
- **$TGA_{1/2}$ (℃) :** Temperature at 50% vaporization (low temperature → high volatility)
- **Residual mass (%) :** Residue mass after vaporization (low value → good thermal stability)

2) DSC (Differential Scanning Calorimetry)
: Decomposition temperature of precursor

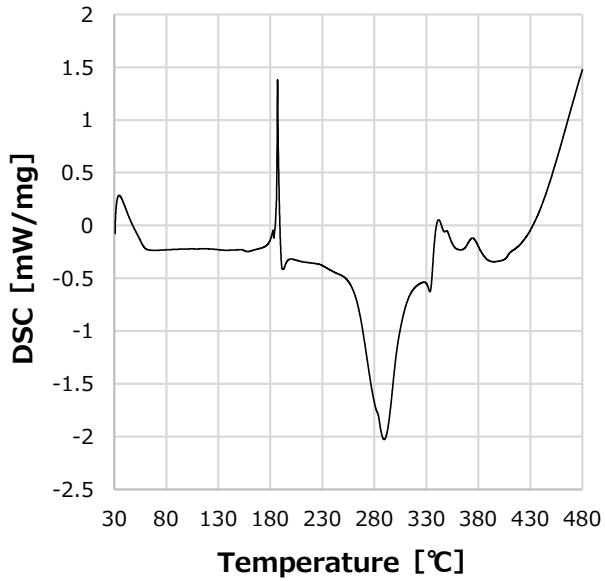
■ Vapor Pressure curve



■ TGA curve

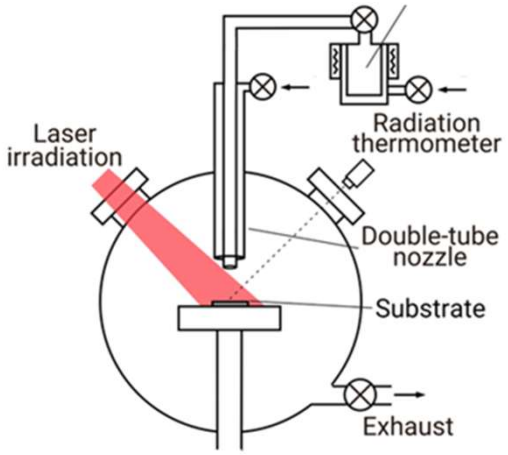


■ DSC curve



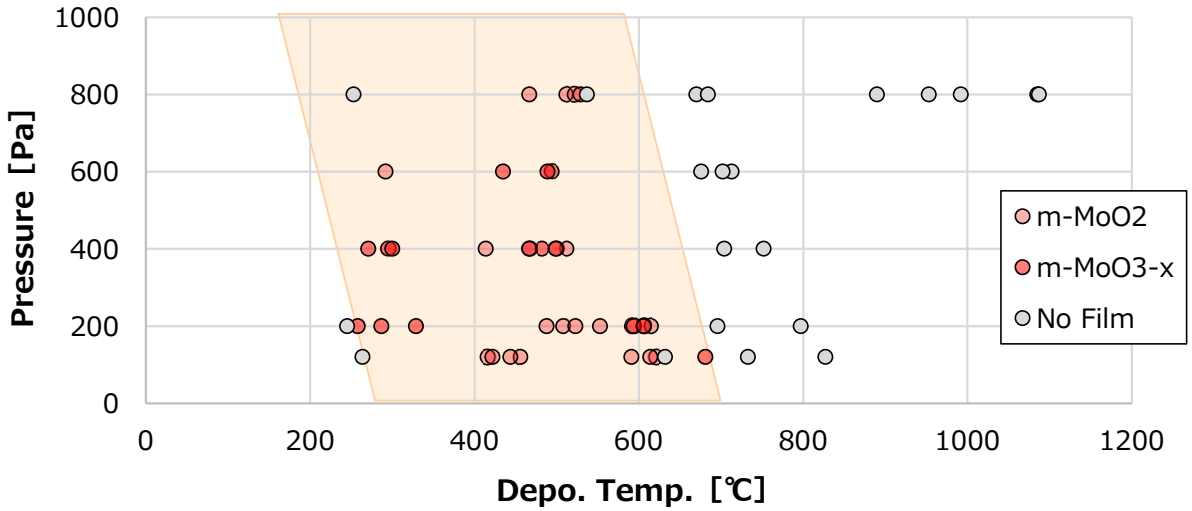
■ Development Project of "New Mo Precursors" Ver.3

□ Laser-CVD evaluation ～ YOKOHAMA National University , Ito Akihiko Lab. ～

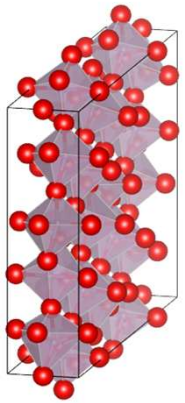


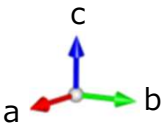
substrate	Si
Precursor	TCMo-23
Reactant	O_2
Depo. Time	10min
Remark	**m-MoO_2**
	m-MoO_{3-x}(0<x<1)

Resalt of Laser-CVD Test



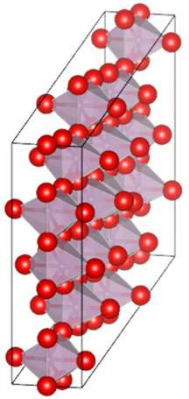
m-Mo_9O_{26}

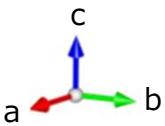




a=16.75 Å
b=4.03 Å
c=14.45 Å
Space group
: P121/a1

m-Mo_8O_{23}





a=16.8 Å
b=4.04 Å
c=13.4 Å
Space group
: P121/a1