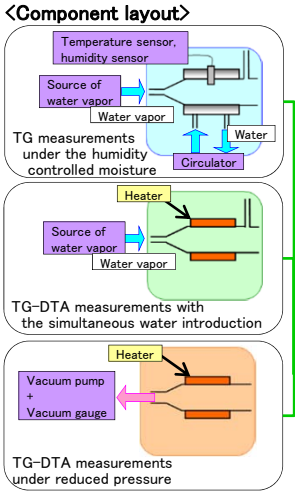
Thermogravimetry-Differential thermal analysis (TG-DTA) measurements under various atmosphere

Specialized TG-DTA measurement system, which perform under the humidity controlled moisture or reduced pressure, is the powerful tool to clarify the weight change and thermal behavior of a material under the various practical use environment, which can not be investigated using usual TG-DTA measurement system.

Overview of the TG-DTA device

<Component layout>

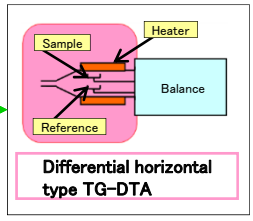


<Condition>

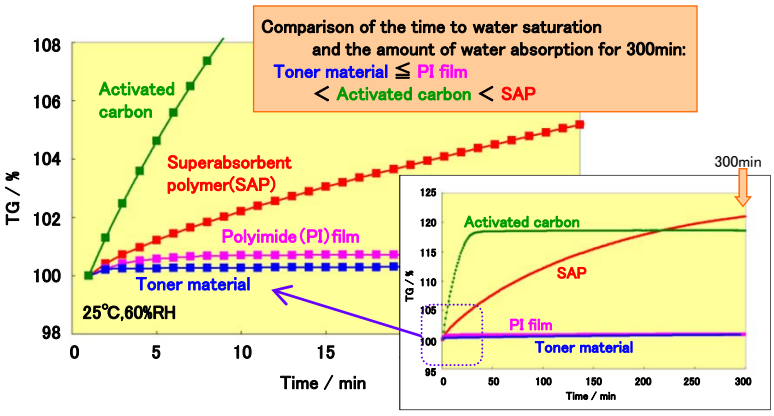
TG measurements under the humidity controlled moisture
- Temperature: 25～80℃
- Humidity: 20～80%RH
(with constraint depending on temperature)

TG-DTA measurements with the simultaneous water introduction
- Temperature : RT(Room temperature)～1000℃
- Atmosphere: Damp gas introduced into water at RT

TG-DTA measurements under reduced pressure
- Temperature : RT～1000℃
- Minimum pressure: 5～10Pa

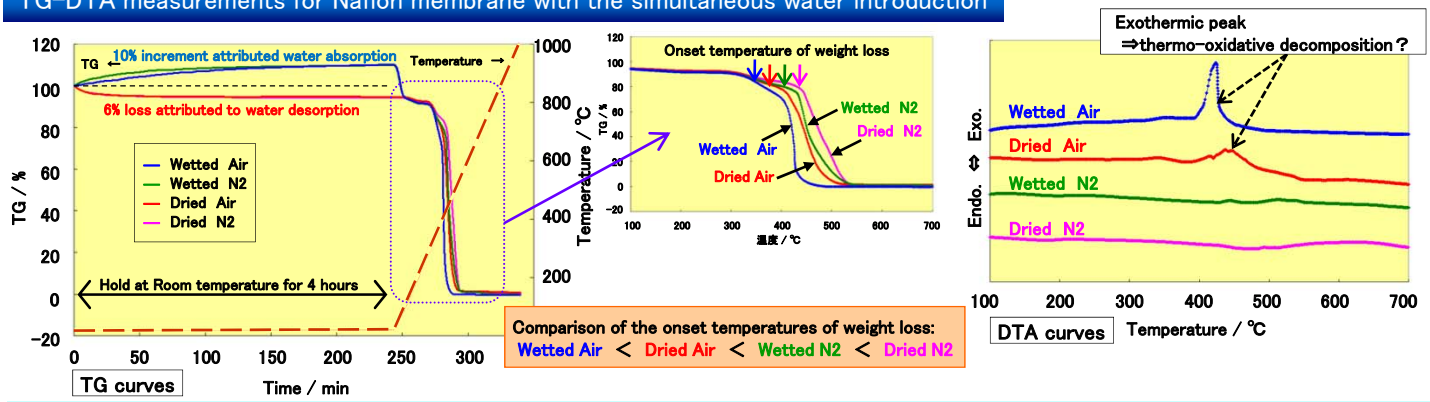


Weight change under the humidity controlled moisture



The weight change attributed to water absorption was observed under a given temperature and humidity. The difference of water absorption behavior between materials can be clarified.

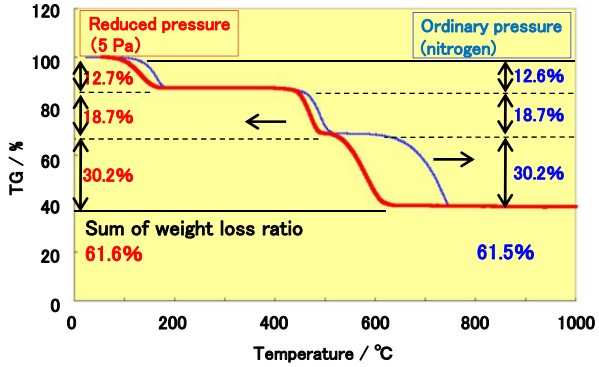
TG-DTA measurements for Nafion membrane with the simultaneous water introduction



Comparison of the onset temperatures of weight loss:
Wetted Air < Dried Air < Wetted N2 < Dried N2

With introduction of a prescribed gas, the weight change and thermal behavior of Nafion membrane was investigated simultaneously. From TG curves, the difference of the water absorption/desorption behavior in isothermal process at room temperature, the onset temperature of weight loss and weight loss behavior at high temperature can be clarified depending on atmosphere. DTA curves can be used to judge whether weight loss is attributed to thermal or thermo-oxidative decomposition.

TG measurements under reduced pressure for calcium oxalate hydrate



Weight loss ratio in $CaC_2O_4 \cdot H_2O$ decomposition estimated from chemical equations (theoretical value)

<1st weight loss>	$CaC_2O_4 \cdot H_2O$	→ $CaC_2O_4 + H_2O$	(12.3%)
<2nd weight loss>	CaC_2O_4	→ $CaCO_3 + CO$	(19.2%)
<3rd weight loss>	$CaCO_3$	→ $CaO + CO_2$	(30.1%)
<Sum of weight loss ratio>			(61.6%)

Despite pressure difference, experimental values of sum of weight loss agree with theoretical one. However, the onset temperature of weight loss in reduced pressure is lower than that of ordinary pressure.