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Product Note | Water Getter, Commercial, Type WGC

The Problem

As long as electronic and optoelectronic devices have been packaged in high reliability hermetically sealed packages there have been problems caused by outgassing of water vapor.

In semiconductor/electronic components/board systems:

- corrosion, caused by condensate, aggravated by ionic contamination
- secondarily, parametric instability, caused by condensate or adsorbate bridging conducting elements

In MEMs or anything with moving parts:

- stiction, caused by water molecules adsorbed from vapor onto moving surfaces
- secondarily, corrosion and parametric instability as previously noted

In optical devices:

- optical interference in the IR range, caused by moisture in vapor phase
- secondarily, corrosion and parametric instability as previously noted

The literature is extensive on the problems and their solutions. Please see the references section at the end of this tech note for further information.

The Solution

Reliability issues caused by water are typically resolved by a combination of process improvements and by the use of active materials called getters, which react with the water molecules to remove them from the system. Active Material's WGC type getter sorbs water vapor using well understood chemistry that has been in use for decades. We integrate this chemistry into a sheet form for easy integration in devices and packages.

Flexible Configuration

Standard HWGC is provided as a thin molded sheet, nominally 0.010" (0.254 mm) thick. The sheet is protected by mylar release liners on both sides. Custom configurations to include molded parts can be quoted on request.

Performance

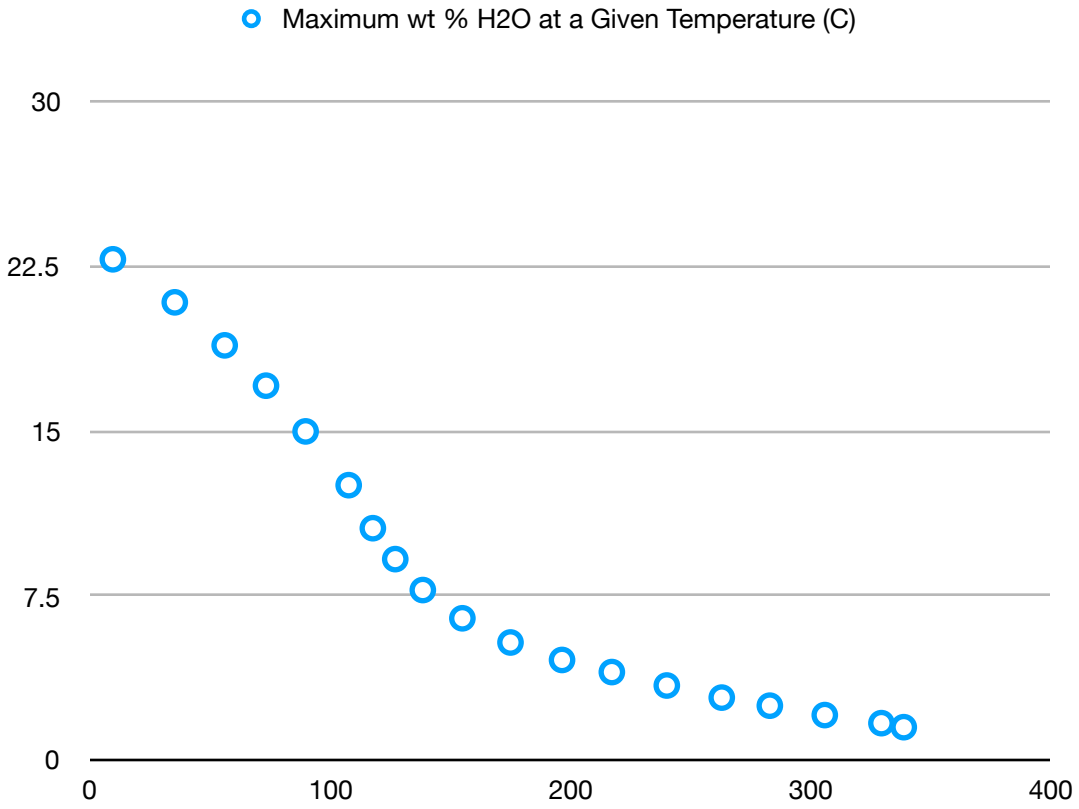
- WGC consists of specially prepared molecular sieves dispersed in a white silicone matrix. It works by physisorbing water vapor within the volume to be be gettered.
- Moisture capacity varies with the degree of activation of the getter. WGC has a water capacity of up to 11 wt% depending on the degree of activation reached.
- WGC is flexible from -55C to 150C.
- WGC is thermally stable to 200C.

Using WGC

Standard WGC is provided as a thin molded sheet, nominally 0.010” (0.254 mm) thick. The sheet is protected by mylar release liners on both sides. Custom configurations to include molded parts can be quoted on request.

WGC is simple to use. Cut an area of the sheet sized to provide the desired water vapor capacity. The Active Materials engineering team provides assistance in determining how much WGC to use. Before attaching the getter please remove the release liner on either side of the getter. The getter is typically attached to the desired area of the package using either silicone or epoxy adhesives depending on the surface it is to be attached to. Please contact us for suggestions.

Proper activation of WGC is necessary in order to deliver maximum performance. Activation is time and temperature dependent. Getter activation requires temperatures above 100C in a dry atmosphere or vacuum ambient.



Please note that the above curve is for pure molecular sieve. The carrier material we use to mold the getter reduces the maximum capacity to ~ 11 wt%.

As this equilibrium capacity curve for vacuum baked molecular sieves demonstrates, there are tradeoffs in terms of capacity and activation temperature. For example, a bake out of around 150 °C (common in industry) will allow WGC to sorb ~8 to 9 wt% water vapor.

Activation profiles with lower temperatures/time/in air are possible depending on the process requirements. After activation is complete, exposure to room air must be minimized as the gettering component will rapidly rehydrate. Assembly and seal in a dry gas environment is strongly recommended to preserve maximum getter performance.

Customer Support

We don't just sell getters, we support our customers over the long haul. Our team has decades of engineering experience in getters, gettering, analytics and device packaging. We can help you solve your problems whether it be with gettering materials or engineering services. Please contact us at +1-719-966-4296 or contact@active-materials.com!

References

"Hermeticity of Electronic Packages," Hal Greenhouse et al

"Moisture in Microelectronics: Physics and Chemistry of Volatile Species in Hermetic Electronic Devices," Phillip wh Schuessler

There is a large body of interesting information on the Oneida Research web site at https://www.orslabs.com/publications/

Active Materials maintains a large library of literature related to outgassing, getters and gettering, leaks and other topics of interest to the practitioner. Please let us know if we can be of help.

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