Microwave Processing: Lab Scale Experimental Apparatus

Harper International

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About Harper International

Harper International is a global leader in complete thermal processing solutions and technical services essential for the production of advanced materials. From concept to commercialization, from research scale to full production line operations, Harper is perpetually on the cutting edge.

As experts in advanced processes up to 3000°C, our material experience includes Carbon Fiber, metal powders, technical ceramics, nano materials, nuclear materials and more.

For additional information, visit harperintl.com or email info@harperintl.com

Harper International designs advanced Microwave thermal processing systems, and offers in-house Microwave testing as part of our Ignite™ program. A small batch apparatus is available at our Technology Research Center for testing customer processes and materials using microwave energy.

In microwave processing, the material is the "heating element" and hence the response to the microwave energy input depends on the properties of the material. Some of the relevant properties are dielectric constant, the dielectric loss tangent (which determines the heating), the form of the material (powder, agglomerate) and the bulk density of the material.

The design of the equipment is related to these properties and can therefore be very different for different materials. For all microwave processing other than drying, it is necessary to evaluate the heating behavior of the material in a microwave field.

Harper's Lab Scale Experimental Apparatus is capable of delivering up to 3kW of microwave energy and it can be controlled in steps of 50W. The frequency of the radiation is 2450MHz. The current aluminum container designed as a single mode applicator can reach very high temperatures. If a controlled atmosphere is required, a quartz container can be placed with quartz tubes extending through the holes of the applicator. Connecting gas sources to the quartz enables atmosphere control.

Testing on a small batch scale enables the development of the proper processing conditions and for defining suitable materials of construction. It is often the case that the properties of the material being tested can change as a function of temperature and time. Small tests enable proper equipment design to deal with these changes.

Harper's laboratory team is available to support testing for a wide range of applications and materials. With over 30 years of experience with Microwave systems, you can trust Harper's team of engineers to take your unique process from the lab to full commercialization.

Contact Harper today to learn more about our Microwave Processing capabilities!