

APPLICATION SUCCESS STORY



ARLON® Substrates Deliver Reliable Operation in Medical Technologies Medical and Life Science Applications Rely on ARLON® raPIId™ Polyimide Flexible Heaters

CUSTOMER PROBLEM

Ensuring precise temperature control and stability is critical in many medical and life science applications. From life-saving devices to diagnostic instrumentation and detection equipment, polyimide flexible heaters are often specified by medical and life science technology manufacturers due to their unique advantages over traditional flexible heater systems.

The environment in which the medical or life science device is housed may be subjected to a variety of conditions, including the use of chemicals or cleaners, ozone, moisture, bacteria, or fungus. Given this, it is critical that the material of choice be inert/non-reactive. Low outgassing is also an important consideration as outgassing components may impact the proper functioning of the equipment, sensors, or lenses used in DNA analysis or other clinical diagnostic instrumentation.

Additionally, the material selected must have high tensile and tear strength, durability, and moldability to complex geometries. From a construction standpoint, the material must be thin and lightweight due to the space and weight constraints of some applications such as catheters, CPAP, or dialysis machines.

Thermal stability of the material is important as well. The material must be stable at extreme temperatures and provide both uniform heating distribution and excellent heat transfer. Temperature regulation at a specific temperature or temperature range is also critical, since applications such as incubators may require precise temperatures to maintain biological substances, blood, fluid, reagents, etc.

THE ROGERS SOLUTION

ARLON® raPId™ polyimide dielectric substrate is the ideal solution for the demands of various medical and life science applications. Its unique construction of an uncured silicone bonded to a polyimide film provides the best of both worlds by combining the benefits of a polyimide with the flexibility and practicality of a silicone adhesive system. The material's construction also increases throughput due to process improvements such as lower temperature and pressure requirements for curing.

ARLON raPId substrates are designed to prevent circuit swimming during capping while minimizing delamination over traditional FEP and acrylic systems. The material also meets ASTM E595 for low outgassing. In the event of an overtemperature situation, ARLON raPId substrates will not melt like FEP or acrylic, providing extra security and safety for flexible heaters.

In terms of key product advantages, it provides excellent thermal stability via a thin and lightweight profile at a wide temperature range from -58 to 232°C (-72 to 450°F) and approximately 50% lighter when compared to a traditional silicone material. These advantages are due to its extremely thin and lightweight design which requires less time than traditional silicones for heat transfer to occur. ARLON raPId substrates can be as thin as 0.13 mm (5 mil), withstand up to 9500 volts and have a flame rating of UL94 HB.

RESULT

Due to the thin profile and precise temperature control of ARLON raPId polyimide substrate, the critical demands of medical and life science applications were achieved. As a result, a variety of devices that detect diseases, improve quality of life and save lives could be manufactured safely and reliably.

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