

NASA TECH BRIEF Ames Research Center

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Protective Encapsulation of Implantable Biotelemetry Units

The problem:

Electronic components are usually protected from the environment by thin coatings of paint, polymers, waxes, etc., but special coatings must be used to protect body-implantable biotelemetry units which consist of electronic telemetry circuits, batteries, and electromagnetic radiators. The problem of providing adequate protection for body-implantable telemetry units is complicated by the highly penetrating and corrosive nature of animal body fluids and by the need for electromagnetic radiators to be electrically unshielded.

How it's done:

An encapsulation method which uses one or more layers of poly(p-xylylene) in conjunction with a material such as silicone rubber so as to take advantage of the properties of both materials.

The solution:

The component parts of the device are interconnected electrically and then protected with conventional prior-art devices such as metal or ceramic packages with metal-to-glass connection feed-through seals. The assembled device, attached to the electromagnetic radiator, is then coated with an encapsulating layer of silicone rubber to provide mechanical support and protection and also to form a body-compatible surface contour. A layer of poly(*p*-xylylene) is then deposited on the silicone rubber and then another layer of silicone rubber is subsequently applied over the poly(*p*-xylylene). As many alternating coats of silicone rubber and poly(p-xylylene) can be applied as is considered desirable. The method of encapsulation utilizes the favorable properties of silicone rubber in animal fluids with the chemical inertness of poly(p-xylylene) and its resistance to penetration. Because the layer of poly(p-xylylene) is sandwiched between silicone rubber, it is protected from mechanical damage, but the outer surface of the capsule retains the desirable characteristics of silicone rubber when immersed in body fluids.

Notes:

- Various types of poly(p-xylylene) can be used so as to emphasize preferred characteristics. The polymer can be applied over the components prior to application of the first layer of silicone rubber. An adhesive promoter may be applied under, over, or on both sides of a layer of poly(p-xylylene).
- 2. Other materials can be substituted for the silicone rubber.
- 3. No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer Ames Research Center Moffett Field, California 94035 Reference: B72-10301

Patent status:

No patent action is contemplated by NASA.

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