June 1972 B72-10367

AEC-NASA TECH BRIEF

Bondability of RTV Silicone Rubber

Cured two-part Room Temperature Vulcanizing (RTV) silicones are not bondable with common organic adhesives such as epoxies or neoprene. Attempts to develop bondable surfaces on cured RTV have primarily involved various silicate or silane primers. These have met with only marginal success.

A new glow discharge method renders the vinyl addition RTV silicone rubber surface bondable. An activated oxygen plasma acts on both sides of the RTV specimens in a glow discharge chamber for 10 minutes. The power level is set at 250 watts and the oxygen pressure at 1 millimeter mercury.

This treatment provides the RTV silicone specimens with adhesive bond strength in excess of 500 psi. In contrast, untreated specimens exhibited adhesive bond strengths of less than 10 psi.

The glow discharge treatment challenges the prevailing theory concerning the relationship between surface characteristics and bondability. According to this theory the presence of a "weak boundary layer" (WBL), related to low molecular weight polysiloxane fractions on the surface, contributed to the unbondability of silicone rubber. Therefore, most attempts to produce a bondable surface of silicone rubber were directed toward removal of the WBL.

The glow discharge treatment creates a bondable surface of silicone rubber without removing the WBL. The activated oxygen reacts preferentially with the vinyl groups rather than the ring structured polysiloxanes leaving the WBL virtually unchanged. This implies that the presence or absence of WBL or low molecular weight inclusions is a secondary or negligible factor in the bonding process, and that treatment of the polymer substrate is the primary factor.

Note:

Requests for further information may be directed to:

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Reference: TSP72-10367

Patent status:

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under contract to
Atomic Energy Commission
(AEC-10026)

Category 04