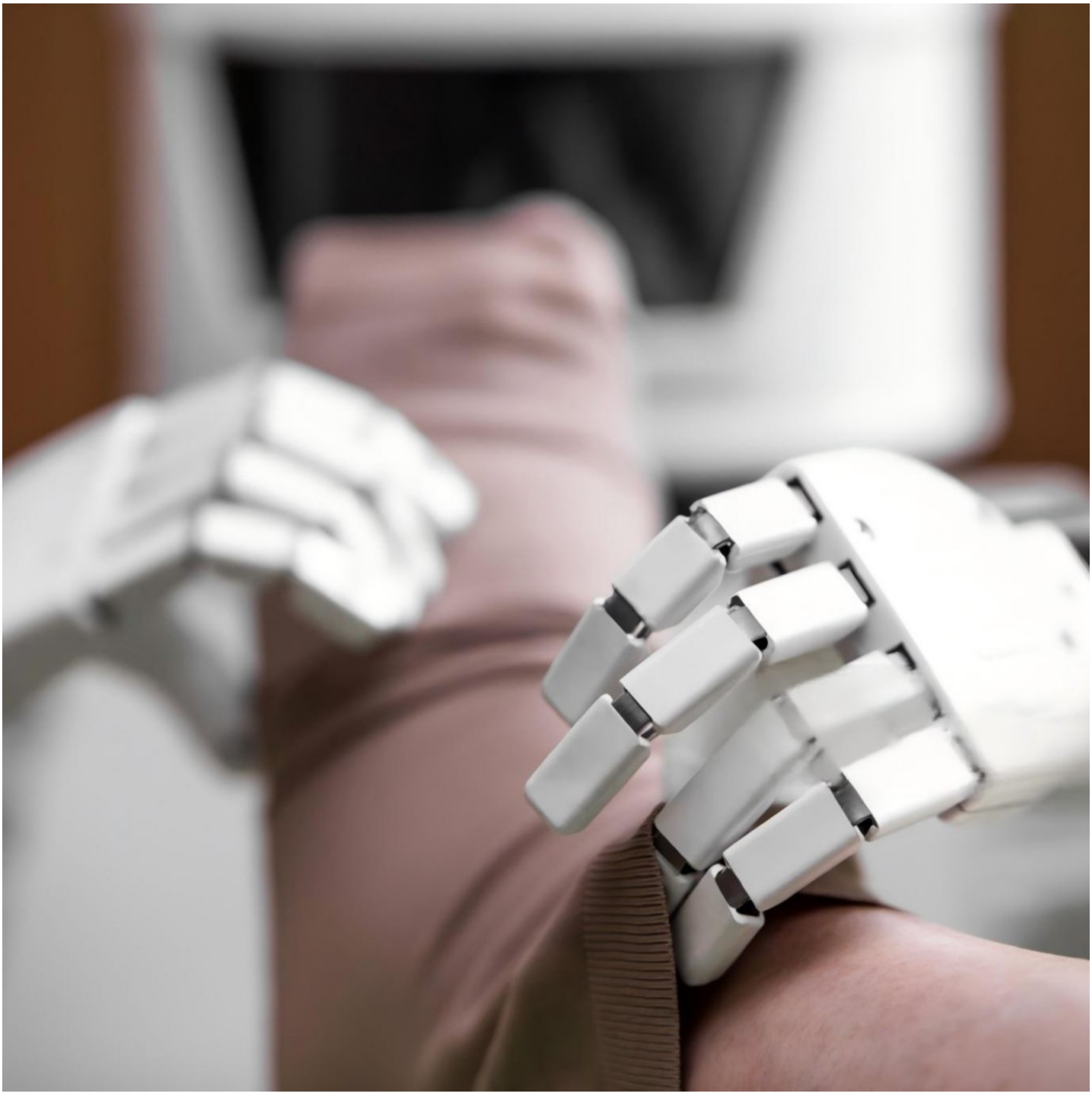
Si-TPV: An Outstanding Elastomer Reshaping Tactile Experience and Performance in Domestic Service Robots



Chengdu, Sichuan Apr 20, 2026 (Issuewire.com) - Why Does the "Skin" of Domestic Service Robots Need a Material Revolution?

As technology companies strive to make domestic service robots smarter and more seamlessly integrated into home environments, a crucial yet often underestimated challenge emerges: the robot's exterior surfaces and components. These parts, which come into direct contact with users' skin, household objects, and varied flooring, are not only critical to product safety and durability but are also central to the user experience. Traditional plastics or rubber materials often force designers to compromise, struggling to simultaneously deliver a skin-friendly tactile experience, reliable performance in wet or slippery conditions, long-term stain resistance, and environmental recyclability.

This is precisely where Si-TPV demonstrates its value as a next-generation engineered elastomer. Capable of being molded directly into complex elastic parts or perfectly bonded to other plastics or metals via overmolding, its core objective is clear: to equip robots with a contact experience that is dry, smooth, safe, and durable — much like human skin itself.

Limitations of Traditional Injection Molding and Overmolding Materials: An Unavoidable Performance Ceiling

Before the emergence of Si-TPV, the industry primarily relied on the following material types in the pursuit of soft touch and functionality—each with its own distinct performance shortcomings:

Thermoplastic Elastomers (TPE): While easy to process, most TPE materials tend to exhibit a sticky surface feel, which not only attracts dust and hair but also results in significantly reduced slip resistance in damp conditions. More critically, their scratch and wear resistance is limited. After prolonged use, the surface can become glossy or even damaged, compromising both appearance and safety.

Thermoplastic Polyurethane (TPU): TPU is known for its excellent abrasion resistance and strength. However, when a soft tactile experience is desired, it often struggles to achieve an optimal skin-friendly balance between hardness and elasticity. Certain soft TPU formulations may rely on low-molecular additives or plasticizing modifiers to achieve low hardness, which can lead to surface oiliness, tackiness, and staining of furniture or the user's skin over time.

Liquid Silicone Rubber (LSR): LSR delivers outstanding tactile quality and excellent stability across a wide temperature range. However, its processing typically requires dedicated liquid injection molding equipment and relatively long curing cycles, which can result in lower production efficiency and higher overall costs. In addition, although LSR can achieve adhesion to engineering plastics such as ABS, PC, or PA through the use of primers or self-adhesive grades, these approaches often involve specialized equipment, extra processing steps, and strict substrate control. This may limit design flexibility and increase total system cost.

Traditional TPV (typically PP/EPDM-based): Conventional TPV systems offer good weather resistance and elasticity. However, their surface texture is often relatively coarse, making it challenging to achieve a premium, smooth, and dry-touch feel comparable to silicone-based elastomers. PP/EPDM TPV generally demonstrates good resistance to non-polar oils, yet it may experience swelling or surface deterioration when exposed to detergents, cosmetic ingredients, or polar solvents commonly encountered in household environments.

The common challenge with these materials lies in their ability to meet only part of the requirements checklist. Compensating for one weakness frequently comes at the expense of another strength.

Si-TPV: An Integrated Solution Starting from Molecular Structure

The innovation of Si-TPV originates from its unique "sea-island" phase morphology—a structure that fundamentally underpins its comprehensive advantages over traditional materials, making it particularly suited for the demanding requirements of domestic service robots:

Inherently Excellent Tactility and Safety from Silicone: Si-TPV inherits the skin-friendly and naturally dry-surface characteristics of silicone. When used for robot housings, handshake areas, or skin-contact components, it delivers a consistently soft, skin-like feel that resists stickiness and dust attraction, significantly enhancing interactive comfort and premium perception.

Revolutionary Wet Slip Resistance and Stability**:** The silicone-rich phase, consisting of microscale silicone elastomer domains in the sea–island structure, provides a naturally dry and non-tacky surface, low surface energy, and stable interfacial characteristics. As a result, Si-TPV exhibits more consistent friction behavior in wet or humid conditions. When combined with appropriate surface texture design, Si-TPV can improve traction reliability on smooth floors, contributing to safer and more stable operation of domestic service robots in kitchens, bathrooms, and similar environments.

Superior Stain Resistance and Long-lasting Appearance: The material's dense surface offers excellent resistance to common stains (e.g., grease, juice) and allows for easy cleaning. Its UV resistance and scratch resistance ensure the robot's appearance resists yellowing and wear over time, maintaining a "like-new" look and performance that upholds brand quality.

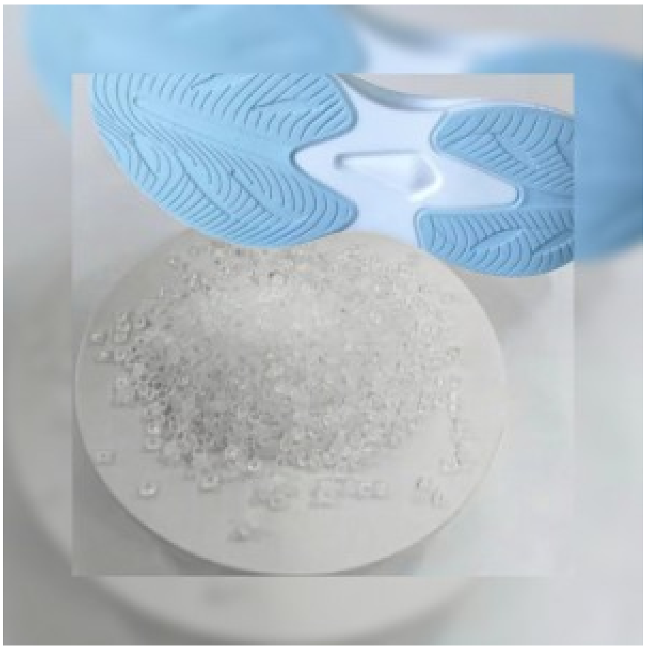
No Migration Risk with Eco-friendly Recyclability: As a fully thermoplastic material, Si-TPV eliminates concerns over plasticizer or small-molecule migration during processing or use, preventing environmental contamination or user allergy risks. Additionally, sprues and end-of-life parts can be directly recycled, aligning with the growing sustainability focus in robotics.

Unmatched Processing and Design Freedom: Si-TPV allows for direct injection molding of complex parts with high production efficiency. More importantly, it exhibits broad overmolding compatibility, forming strong physical bonds with various engineering plastics—both polar (e.g., PC, ABS, PA) and non-polar (e.g., PP, PE). This grants designers the freedom to create "rigid skeleton + soft-touch surface" composites, integrating multiple functions and experiences into a single part, thereby simplifying assembly and reducing overall costs.

For the home service robotics industry, poised on the brink of widespread adoption, competition will ultimately extend beyond hardware specs and feature lists to the very texture, safety, and trust embedded in every human-machine interaction.

Choosing Si-TPV is more than selecting a superior elastomer—it is embracing a forward-looking product philosophy: seamlessly integrating exceptional user experience, reliable environmental adaptability, and responsible eco-design into the very “skin” of the robot through advanced materials science.

This provides brands with a solid yet innovative material foundation for creating truly differentiated, high-quality robots that embody thoughtful, human-centered design. Contact us via amy.wang@silike.cn or visit www.si-tpv.com explore how to integrate Si-TPV into your formulations today.



Media Contact

Chengdu Silike Technology Co.,Ltd.

*********@silike.cn

86-028-83625089

No.336 Chuangxin Ave, Qingbaijiang Industrial Zone, 610300,Chengdu, China

https://www.si-tpv.com/

Source : Chengdu Silike Technology Co.,Ltd.

[See on IssueWire]