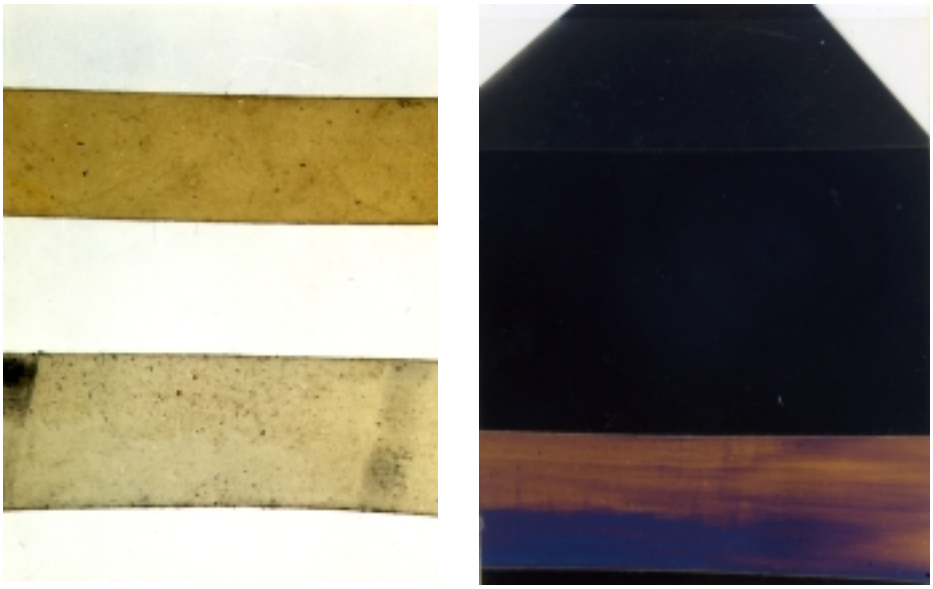
DOUBLE NETWORK ELASTOMERS



Seen here is an isotropic conventional elastomer (top of left photo) and a double network elastomer (bottom of left photo) of equal crosslink density. The double network has both higher modulus and longer fatigue life. The image on the right shows the stable orientation of a double network reflected in the macroscopic birefringence exhibited in the double network rubber. The inherent orientation can be varied with position to suit specific applications.

A new technology has been developed which imparts superior mechanical and failure properties to elastomers. This "double network structure" can be readily implemented in conventional rubber compounds using existing processing techniques. The presence of a double network confers anisotropic mechanical properties, in the manner of liquid-crystal polymers, while retaining the superior processing of flexible chain polymers. When compared to a conventional elastomer having the same crosslink density, a double network rubber exhibits significantly higher modulus, longer fatigue life, and for natural rubber, enhanced strain crystallizability. Enhanced and anisotropic electrical conductivity can also be achieved in carbon black reinforced rubbers.

Potential Applications:

- Tire components (e.g., the carcass and sidewalls)
- Hoses and belts
- Propulsion devices (e.g., non-gaseous aerosol cans)
- Seals
- Anti-static mats, etc.
- Commercially useful Guayule rubber

Points of Contact

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