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Cut Growth Patterns in Double Networks of a Natural Rubber Vulcanizate CRITTENDEN OHLEMACHER, GARY HAMED, Dept. of Polymer Science, The University of Akron — The effect of aging at 90 deg. C and 110 deg. C under nitrogen, with and without applied strain, on black-filled natural rubber, with an inefficient sulfur cure was investigated. Samples aged under strain became "double networks" and retained a residual extension ratio. Cut growth behavior of the double networks was complex. The perpendicular specimens (cut parallel to the applied strain during aging), had cracks that either were "super-blunted" or exhibited "forward" crack splitting. Parallel specimens were weaker than perpendicular and single network ones, and exhibited a critical cut size, for which a small increase in cut size resulted in an abrupt decrease in strength. For cuts smaller than the critical size, crack geometries were "super-blunting", while specimens with larger cuts typically showed simple lateral propagation, without longitudinal cracking or crack splitting. There was some evidence that parallel double network specimens had greater ability to strain-crystallize. However, decreased cut growth resistance of these suggests that limited chain extensibility is controlling.

> Crittenden Ohlemacher Dept. of Polymer Science, The University of Akron

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