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Fluctuations and critical phenomena of a filled elastomer under deformation MINDAUGAS RACKAITIS, XIAORONG WANG, Bridgestone Americas Center for Research and Technology — Fluctuations and critical phenomena have drawn much attention for many years. But, no report anticipates that an elastomer containing fillers under gentle deformations will show similar effects. In this letter, we discover for the first time that a filled rubber system under about 2% strain may display feature fluctuations that could be associated with a transition of the filler from an elastic solid state to a dispersed fluid state and that is reminiscent of critical phenomena. In addition, we show that the fluctuation of macroscopic parameters can be related to the microscopic fluctuation of filler structures in the rubber compound and in principle it can act as a probe of what is happening physically at the microscopic scale.

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