

## **Toward a Unified Solid State Theory for Pre-Earthquake Signals**

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### **A b s t r a c t**

Many different non-seismic pre-earthquake signals have been reported but there is great uncertainty about their origin, their correlation to each other and to the impending seismic event. The discovery of stress-activated electric currents in rocks provides a possible explanation. Stresses activate electronic charge carriers, namely defect electrons in the oxygen anion sublattice, equivalent to  $O^-$  in a matrix of  $O^{2-}$ , also known as positive holes. These charge carriers pre-exist in unstressed rocks in a dormant, electrically inactive state as peroxy links,  $O_3Si-OO-SiO_3$ , where two  $O^-$  are tightly bound together. Under stress dislocations sweep through the mineral grains causing the peroxy links to break. Positive holes, thus generated, flow down stress gradients, constituting an electric current with attendant magnetic field variations and EM emissions. The positive holes accumulate at the surface, creating electric fields, strong enough to field-ionize air molecules. They also recombine leading to a spectroscopically distinct IR emission seen in laboratory experiments and night-time infrared satellite images. In addition positive holes interact with radon in the soil, affecting the radon emanation.

**Key words:** pre-earthquake signals, peroxy, positive holes, EM emissions, earthquake lights, thermal infrared anomalies, radon emanation.