Using lncRNA capture-seq, Liau et al. identified a specific set of lncRNAs that accumulate in the synaptic compartment within the infralimbic prefrontal cortex of adult male C57/Bl6 mice. Among these was a splice variant related to the stress-associated lncRNA, Gas5. RNA immunoprecipitation followed by mass spectrometry and single-molecule imaging revealed that this Gas5 isoform, in association with the RNA binding proteins G3BP2 and CAPRIN1, regulates the activity-dependent trafficking and clustering of RNA granules. In addition, they found that cell-type-specific, activity-dependent, and synapse-specific knockdown of the Gas5 variant led to impaired fear extinction memory. These findings identify a new mechanism of fear extinction that involves the dynamic interaction between local lncRNA activity and RNA condensates in the synaptic compartment [1)].

1)
Liau WS, Zhao Q, Bademosi A, Gormal RS, Gong H, Marshall PR, Periyakaruppiah A, Madugalle SU, Zajaczkowski EL, Leighton LJ, Ren H, Musgrove M, Davies J, Rauch S, He C, Dickinson BC, Li X, Wei W, Meunier FA, Fernández-Moya SM, Kiebler MA, Srinivasan B, Banerjee S, Clark M, Spitale RC, Bredy TW. Fear extinction is regulated by the activity of long noncoding RNAs at the synapse. Nat Commun. 2023 Nov 22;14(1):7616. doi: 10.1038/s41467-023-43535-1. PMID: 37993455.