Creep-enabled 3d solid-state lithium-metal battery

What is a creep-enabled battery engine?
The successful construction of a creep-enabled battery engine opens a new avenue toward high-density, electrochemically and mechanically robust all-solid-state Li-metal batteries.

What is a 3D Li-foil battery?
The 3D porous MIEC/ELI structure is combined with Li metal to form the anode of the all-solid-state battery. Compared with the current 2D Li-foil anodes,the multiple electrochemically engineered interfaces endow the creep-enabled 3D anode with distinct kinetics of Li deposition and stripping.

What is the creep mechanism of Li metal?
Several creep mechanisms exist for metals. The creep strain rate ? (T,?) of Li metal could possibly be driven by the dislocation creep(power-law creep) or diffusional creep (linear creep),according to the deformation mechanism map of metals (Figure 3 B).

Can a 3D solid-state Li-metal battery achieve a gravimetric energy density?
With those practical low-cost and viable approaches for further optimizations,we estimate that a practical pouch cell of the creep-enabled 3D solid-state Li-metal battery can attain a gravimetric energy density of over 500 Wh kg -1and a volumetric energy density over 800 Wh L -1.

What if diffusional creep mechanisms are operative?
If diffusional creep mechanisms, either the lattice-diffusional Nabarro-Herring creep or interfacial/surface-diffusional Coble creep, are operative, then ? (T, ?) ? ?, the viscosity ? would depend on T and grain size, but not on ?, and Li metal would behave like a Newtonian fluid.

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Most previous studies concentrate on improving the solid electrolyte to solve these problems. In this talk, we will introduce a promising new strategy for creep-enabled 3D ...

Abstract Customized solid-state lithium metal batteries (SSLMBs) with high safety hold promise for next-generation energy storage systems, yet they suffer from rapid ...

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Existing all-solid-state Li-metal batteries suffer attacks by the chemically aggressive and mechanically stressful Li metal. Li metal is a soft crystal and may exhibit either displacive or ...

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