

# Effect of hydrogen accumulation on precipitates on the plasticity of Al-Cu alloy

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With the help of MD simulation, a study was made of the effect of hydrogen accumulation on  $\theta'$  phase precipitates for the strengthening and nucleation of dislocations in Al-Cu alloy. We considered different hydrogen concentrations near and inside the precipitate volume. It is shown that an increase in the number of hydrogen atoms leads to the mechanism of the dislocation-precipitate interaction change. The formation of the Orowan loop, which occurs in the absence of hydrogen, is replaced by the cutting of precipitates. The decrease in overcoming stresses in this case is about 25%. The data obtained in MD calculations are further used to calibrate the dislocation-precipitate interaction model proposed in [1, 2], which takes into account the transition from the formation of Orowan loop to the precipitate cutting. The interaction model is used at the level of discrete dislocation dynamics, which describes the mechanical response of a representative volume with a large number of dislocations and precipitates.

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- [1] Krasnikov V S, Mayer A E, Pogorelko V V, Latypov F T and Ebel A A 2020 *Int. J. Plast.* **125** 169–190
- [2] Fomin E V, Mayer and A E Krasnikov V S 2021 *Int. J. Plast.* **146** 103095