

TEM Study for the Identification of Phases in Al₂₀₂₄ Alloys Cold-Rolled 30%ε

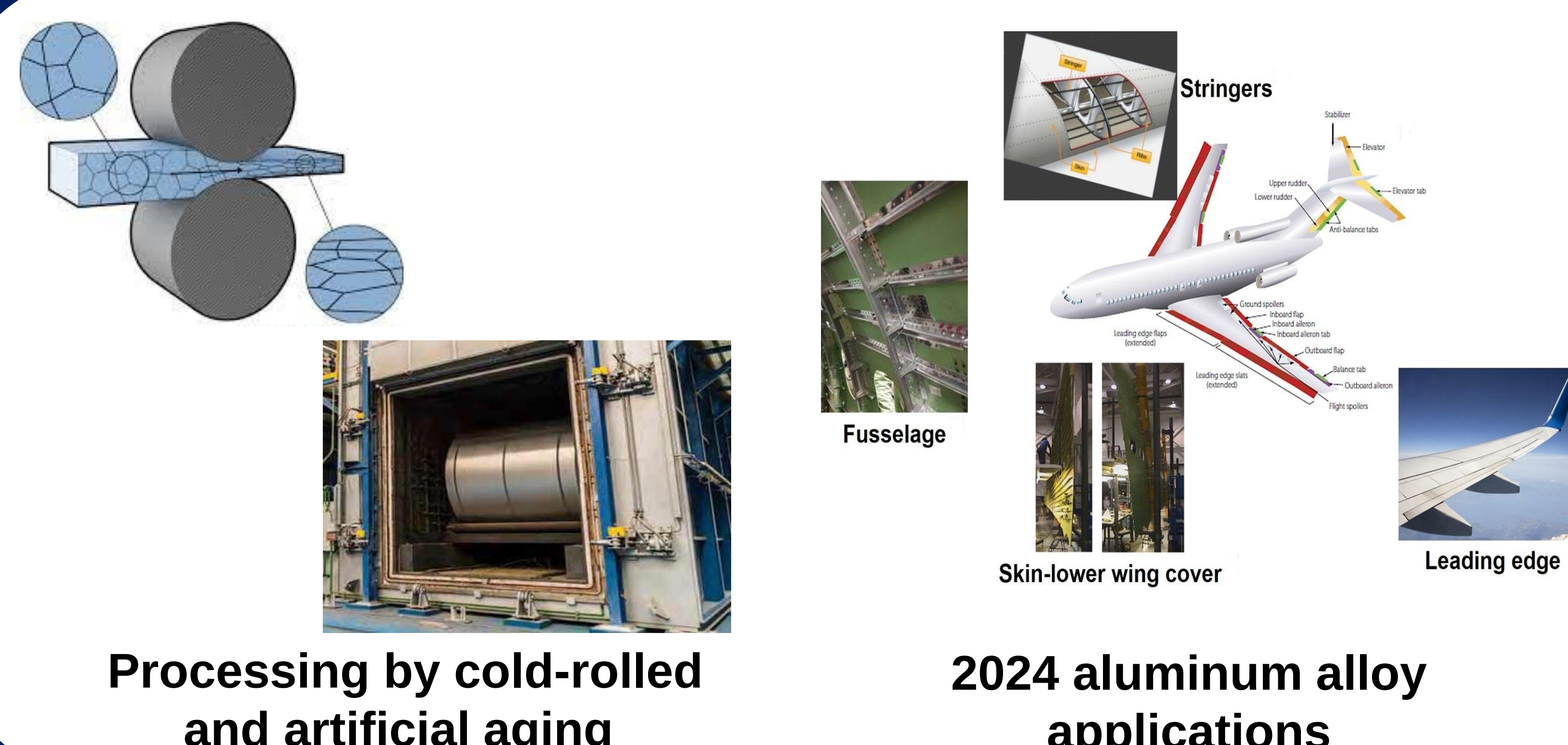
J.C. Guía-Tello¹, C.G. Garay-Reyes¹, H.M. Medrano-Prieto¹, G. Rodriguez-Cabriaes¹,

M.A. Ruiz Esparza-Rodriguez¹, J.M. Mendoza-Duarte¹, R. Martínez-Sánchez¹.

¹ Centro de Investigación en Materiales Avanzados (CIMAV), Laboratorio Nacional de Nanotecnología, Miguel de Cervantes No. 120, C.P. 31109, Chihuahua, Chih., México.

² Universidad Tecnológica de Chihuahua Sur. Km. 3 Carretera Chihuahua-Aldama S/N, CP 31313, Chihuahua, Chih., México

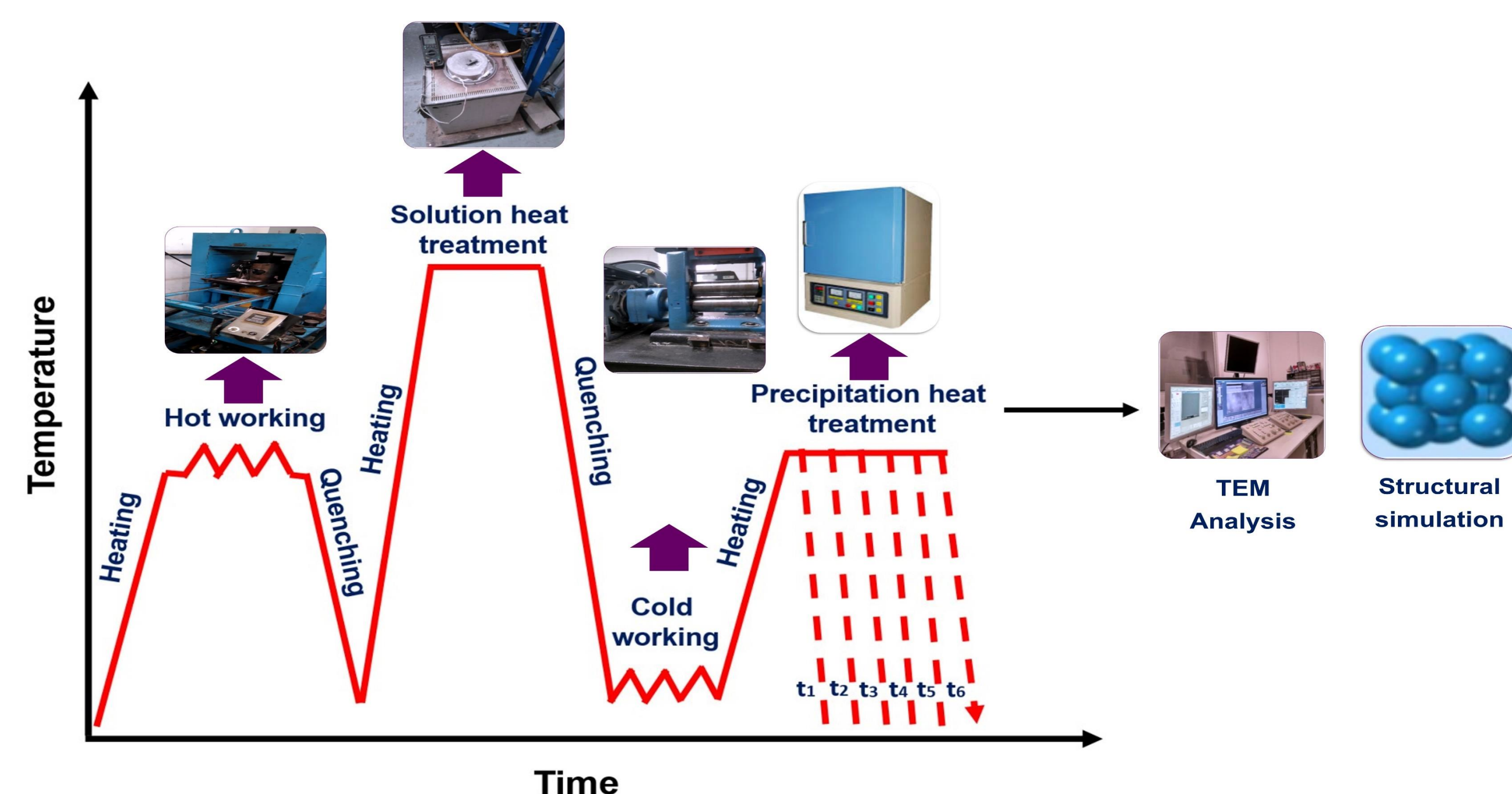
1. INTRODUCTION



2. OBJETIVES

1. To identify the type precipitates by TEM in a 2024 aluminum alloy cold-rolled 30%ε after an aging process.
2. To perform structural simulation of precipitates identified by TEM study.
3. To establish the effect of cold-rolled 30%ε on the precipitation sequence in 2024 aluminum alloy.

3. METHODOLOGY



4. RESULTS

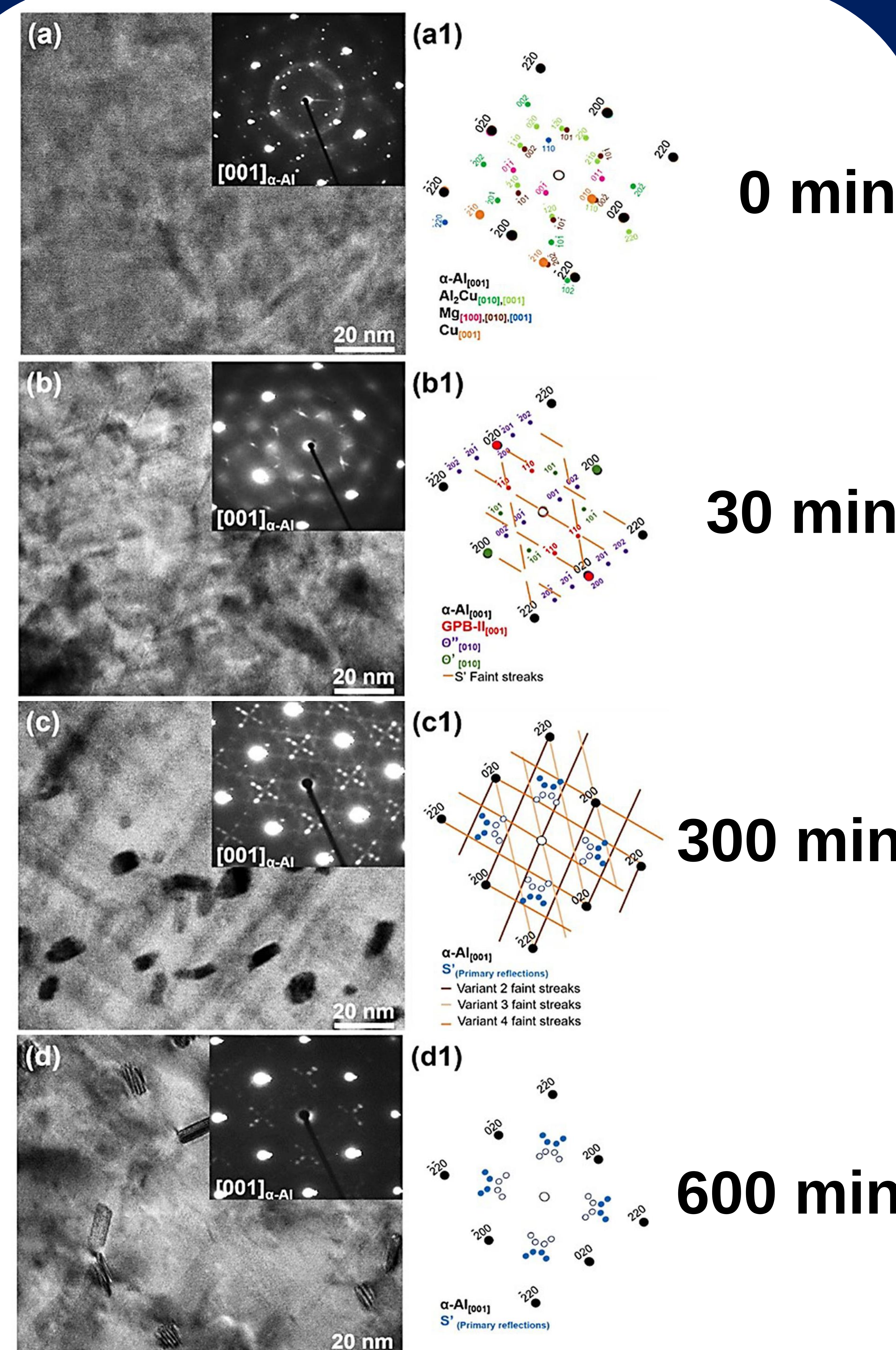


Figure 1. TEM studies of 2024 aluminum alloy cold-rolled 30%ε aged at 195°C, with their respective structural simulations to different aging times.

5. CONCLUSIONS

- To different aging times, the cold-rolled 30%ε contributes to the precipitation of phases GPB-II, θ'', θ', and S', respectively. These phases were corroborated by structural simulation.
- TEM diffraction patterns to 300 min aging indicated the precipitation of different variants of the S phase (2,3 and 4). Such variants were formed before to achieve the total precipitation of the S phase to 600 min aging.
- The precipitation sequence for deformed alloy was established as α_{SSS} –CuMg clusters→GPB-II/θ''/θ'→S'→S.

6. ACKNOWLEDGMENTS

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7. REFERENCES

- [1] J.Z. Liu, S.S. Yang, S.B. Wang, J.H. Chen, C.L. Wu, J. Alloys Compd. **613** (2014) 139–142.
- [2] S.Q. Wang, M. Schneider, H.Q. Ye, G. Gottstein, Scripta Mater. **51** (2004) 665–669.
- [3] G.B. Winkelman, K. Raviprasad, B.C. Muddle, Acta Mater. **55** (2007) 3213–3228.
- [4] N. Ünlu, B.M. Gable, G.J. Shiflet, E.A. Starke Jr., Metall. Mater. Trans. A **34A** (2003) 2757-2769.