Chain Scission Resists with Wide Recording Margin for Various Lithography Applications

Seiji Morita
Wisdom Pool Research Institute G.K.
Mitsui-Linklab-Shimkiba2, 1-17-8, Shimkiba, Koto-ku, Tokyo, 136-0082 Japan
smorita@wpri.co.jp

Introduction

Chain scission resists have excellent fine pattern resolution, and although they are organic materials, they have been reported to have fine pattern resolution similar to metal oxide resists (MOR)[1]. In addition, next-generation chain scission resists (bio-resists) that incorporate biomass structures that produce high G-values have been reported[1].

However, these chain scission resists have two challenges. One is the issue of reduction of CO_2, and the other is the issue of poor recording margin. Regarding the first challenge, we have already reported that we have developed a plant-derived biomass developer that can be reused as a biofuel such as SAF after using for these chain scission resists, making a significant contribution to carbon-neutral[2]. This time, we have developed a new chain scission resist with a wider recording margin.

Experimental Results

First, the monomer was synthesized using plant residues as crude raw materials and polymers were polymerized. These were dissolved in PGMEA solvent to obtain multiple types of chain scission resist solutions. Next, the resists were spin-coated on the silicon wafers and prebaked. Fine patterns were obtained by electron beam recording on the surface of the wafer and developing with the developers. Figure 1 shows the SEM images of the fine pattern recording results of these new chain scission resists.

Summary

Three types of chain scission resists provide an exposure recording margin of more than ±20%. Chain scission resist with wider recording margin was developed. In this conference, the results of ultrafine pattern recording etc. and the importance of this approach using bio-resist with biomass developer for carbon neutral will be reported.

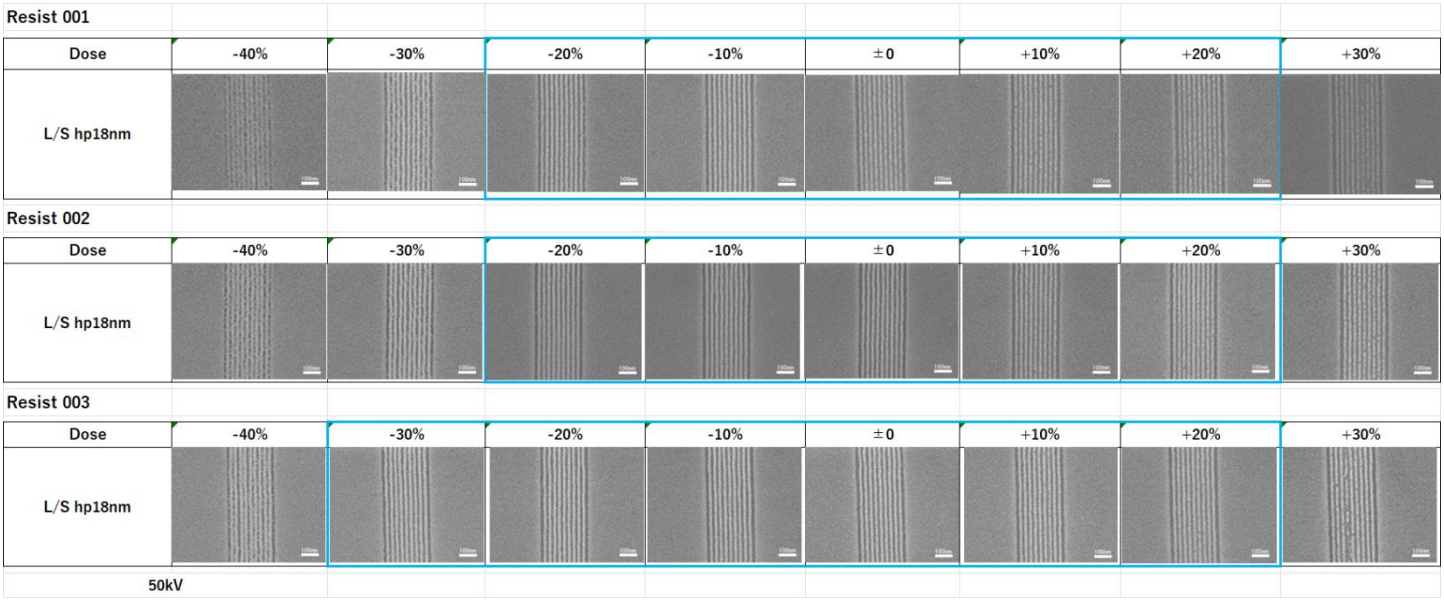

Figure 1: SEM images of L/S smaller patterns after recording of three types of chain scission resists

References

[1] K. Morita, Y. Yoshikura, H Sunaga and Y Yanagisawa, Proc. of SPIE Vol. 13428 134280V (2025)
[2] S. Morita, Proc. of SPIE Vol. 12957 1295719 (2024)