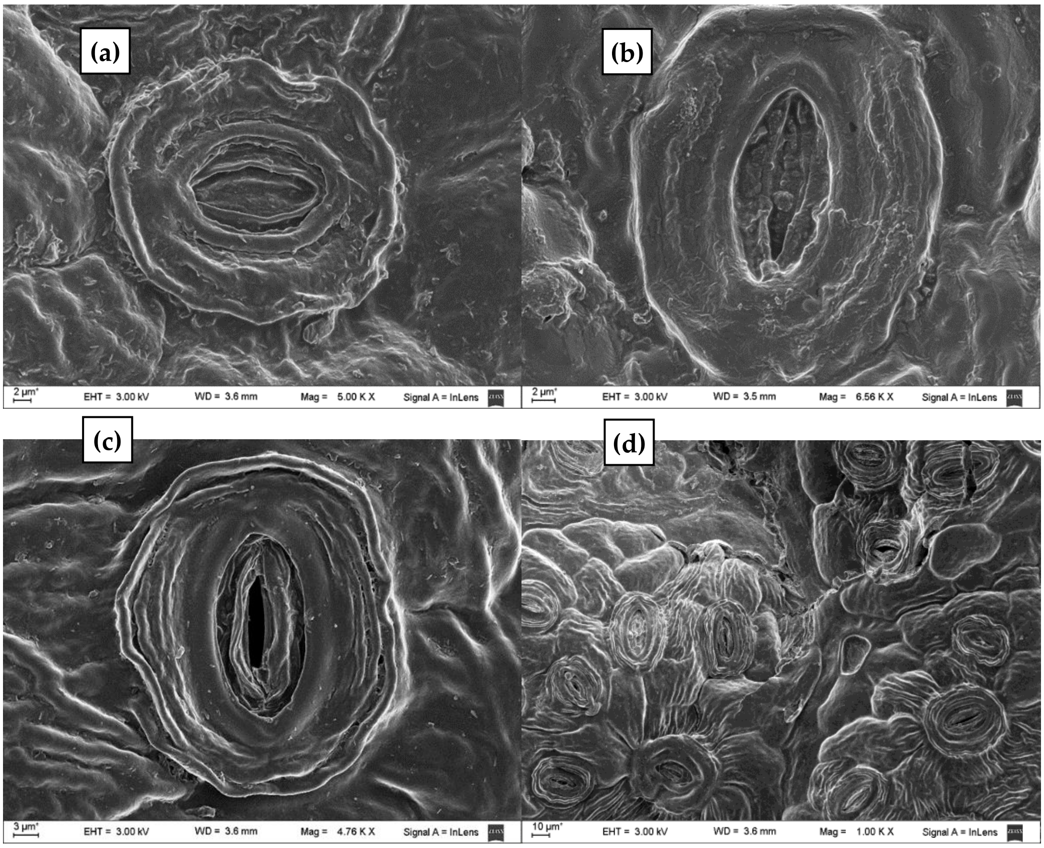

Figure 8. SEM photographs of: (a) untreated leaf stoma; (b) leaf stoma of a sample digested with a dilute solution of sulphuric acid at T = 90°, t = 90 min using 5 g solid/ 20 mL liquid ratio; (c-d) leaf stomata of a sample digested at T = 90°, t = 90 min using 10 g solid/ 20 mL liquid ratio.

4.4. Pretreatment performance response surface regression

The results obtained from the pretreatment DoE were analyzed based on RSM. A polynomial quadratic regression equation was obtained, representing the effect of independent factors and their interactions towards the output (solid fraction yield or % delignification). The interactive effects of parameters were analyzed based on 3D response surface plots. Each response was tested for a suitable best-fitting model. Analysis of variance (ANOVA) was done for the model terms (**Table 3**). The measured responses will be subjected to multiple least squares regression analysis. The student's t-test is used to evaluate statistical significance. Fischer's F test weights the adequacy of the mathematical regression model.

Interpretation of the parametric interaction of hemicellulose yield and lignin removal was evaluated as a combined effect of the three factors: time, temperature, and solid loading. Analysis of variance indicated a satisfactory linear model fit the solid fraction yield, with significant influence on the temperature and solid loading (**Table 3**). Maximum yields were attained for lower temperatures and the highest solid loadings (**Figure 5**).

Delignification was not well predicted by a linear or a single quadratic model; the best fit with a full quadratic model led to an R square of 76%. The analysis of variance indicated a significant influence of the solid loading and the temperature-solid loading interaction. As observed in **Figure 6**, the effect of solid loading on delignification is negative, interpretable mainly by the stoichiometry of the reaction between the oxidant