Features of FeB pair light-induced dissociation and repair in silicon n^+–p-p^+ structures under ultrasound loading

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The influence of ultrasound on iron–boron pair dissociation and association in silicon n^+–p-p^+ structures were investigated experimentally. The FeB pair transformations were monitored by measurements of short circuit current kinetics. It was found that ultrasound causes the decrease in both the concentration of pairs, which were dissociated by light, and time of association. The phenomenon was investigated at different light intensities, temperatures, frequencies and power of ultrasound loading. The possible mechanisms underlying the revealed effects were analysed.

I. INTRODUCTION

It is of wide knowledge that the properties of semiconducting crystals and structures are determined very much by their impurity compositions. As a result, the methods aimed at modifying the system of defects are very important for practical applications. Most of the similar methods use irradiation, thermal treatment or specific conditions of crystal growth. However, numerous experiments show that ultrasound also represents a sufficiently effective instrument in order to better control the semiconductor defects. For example, it has been found that the acoustic waves cause spatial redistribution of defects[1–6], transformation of metastable point defects[7–9], recharging of recombination centers[10,11], low temperature annealing of radiation defects[12–16]. The effects of this kind are observed in particular in silicon, which is the basic modern material used in microelectronics and solar power engineering[1,2,5,8,12,15,17,18].

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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