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High temperature bulk diffusion in GaN B. SADOVYI, I. GRZEGORY, J. WEYHER, I. DZIECIELEWSKI, A. KHACHAPURIDZE, S. POROWSKI, Institute of High Pressure Physics PAS, Sokolowska str., 29/37, 01-142 Warsaw, Poland, I. PETRUSHA, V. TURKEVICH, V. N. Bakul Inst. for Superhard Materials NASU, Avtozavodska str., 2, Kyiv, 04074, Ukrain, D. STATI-ICHUK, V. N. Bakul Inst. for Superhard Materials NASU, Avtozavodska str., 2, Kyiv, 04074 UA, V. KAPUSTIANYK, Dep. of Phys., I. Franko National Univ. of Lviv, Dragomanova str., 50, Lviv UA 79005, M. ALBRECHT, Leibniz Inst. for Crystal Growth, Max-Born-Straße 2, 12489 Berlin, Germany, IHPP PAS TEAM, ISM NASU TEAM, LVIV I. FRANKO NATIONAL UNIV. COLLABORATION, IKZ COLLABORATION — Surprisingly, gallium nitride single crystals grown by High Nitrogen Pressure Solution method at temperature as high as 1750 K show non uniformities in distribution of impurities which suggests still slow bulk diffusion and very high melting temperature of GaN. In this work, GaN single crystals have been annealed at temperature up to 3350 K at pressure up to 9 GPa in order to induce homogeneization of crystal properties by bulk diffusion. For this purpose the crystals with intentional patterns of impurity distribution were used. The crystals before and after annealing were characterized by PL and CL mapping, photochemical etching sensitive to free electron concentration. It was established, that the bulk diffusion starts at temperature as high as 3300 K. It is reflected in uniformization of both optical and electrical properties of the crystals. This estimation suggests then melting temperature of GaN is significantly higher than current belief [1].

[1] W. Utsumi et al. Nature Materials **2**, 735 (2003).

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