Supplementary materials to

Electrical Relaxation and Transport Properties of $ZnGeP_2$ and 4H-SiC Crystals Measured with Terahertz Spectroscopy

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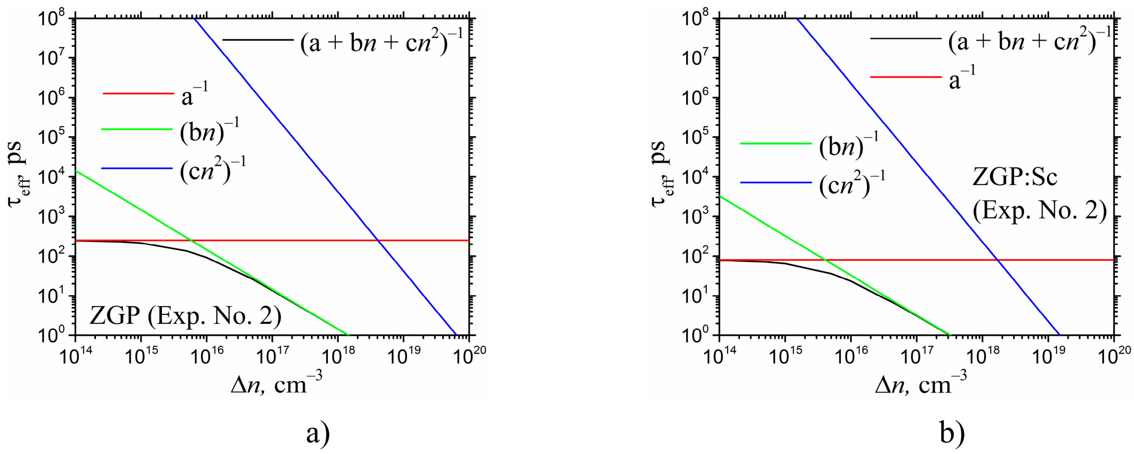


Figure S1. Calculated injection level dependences of efficient charge carrier lifetime with the resolution into contributions from different recombination mechanisms for (a) $ZnGeP_2$ (Exp. No. 2) and (b) $ZnGeP_2$:Sc (Exp. No. 2).

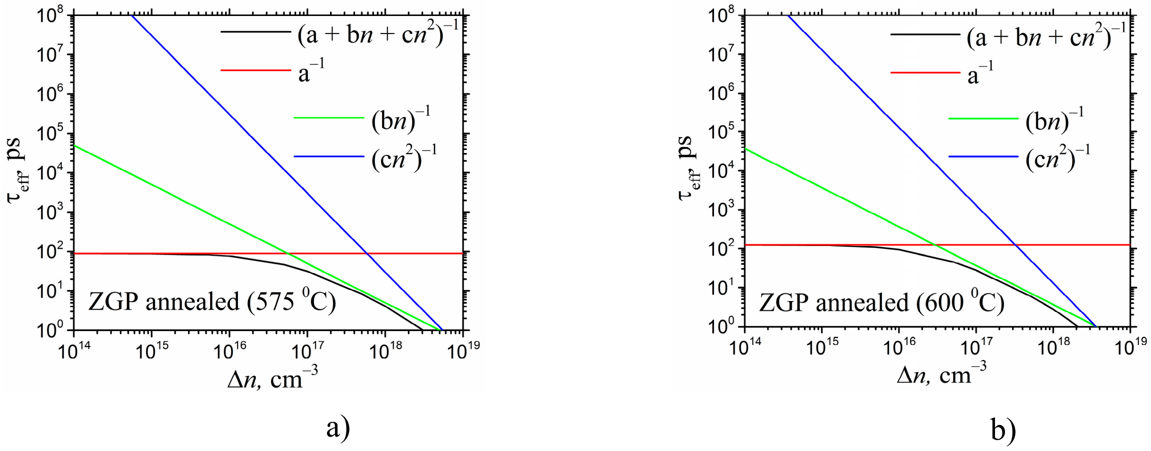


Figure S2. Calculated injection level dependences of efficient charge carrier lifetime with the resolution into contributions from different recombination mechanisms for (a) $ZnGeP_2$ (Exp. No. 1) annealed at T=575 ⁰C and (b) $ZnGeP_2$ (Exp. No. 1) annealed at T=600 ⁰C.

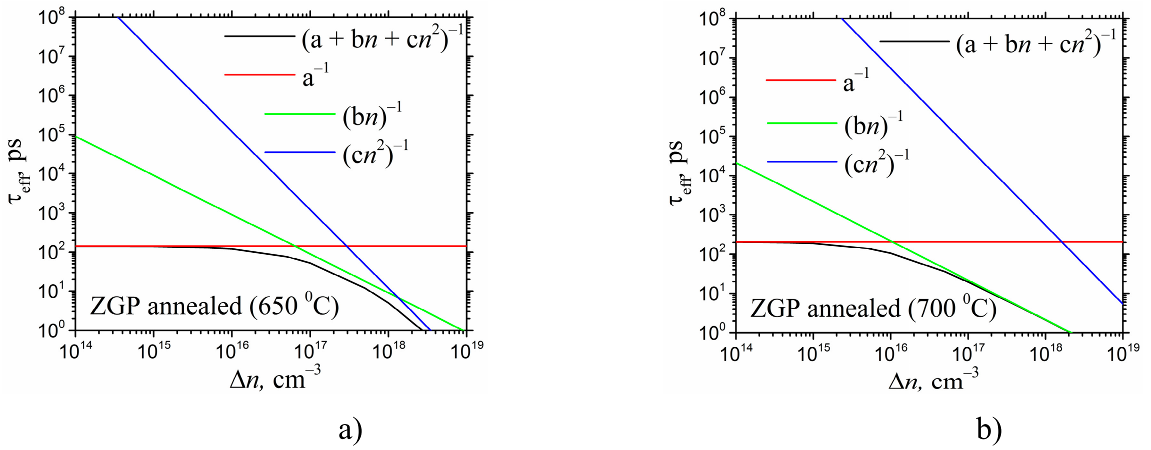


Figure S3. Calculated injection level dependences of efficient charge carrier lifetime with the resolution into contributions from different recombination mechanisms for (a) $ZnGeP_2$ (Exp. No. 1) annealed at T=650 ⁰C and (b) $ZnGeP_2$ (Exp. No. 1) annealed at T=700 ⁰C.

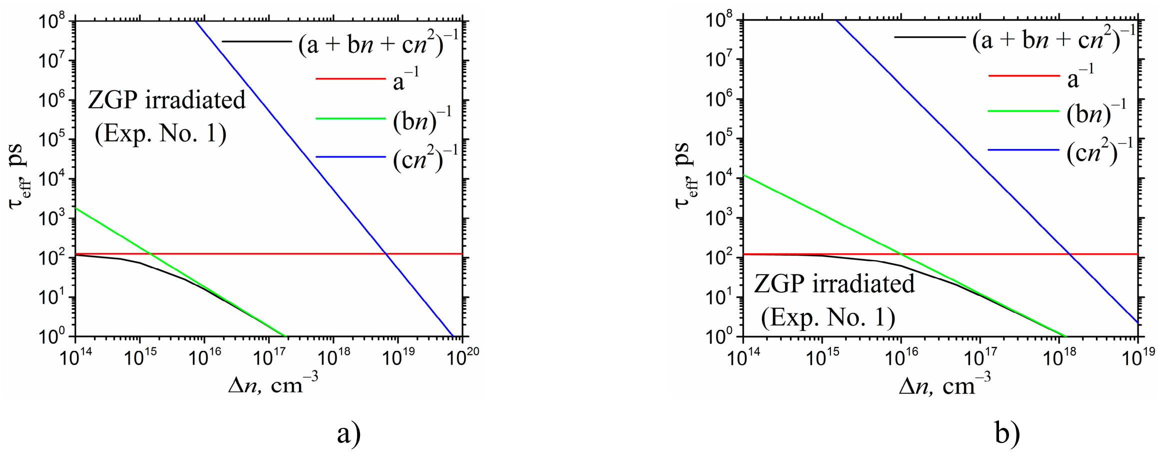
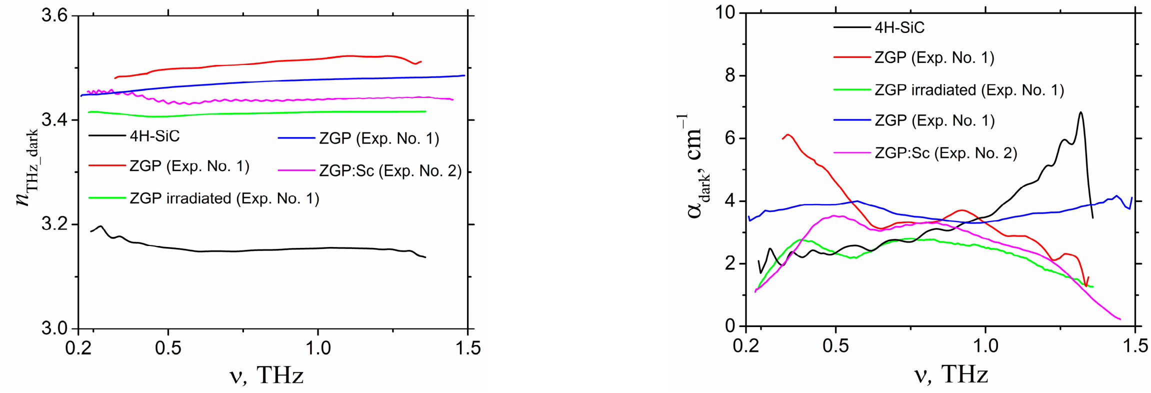
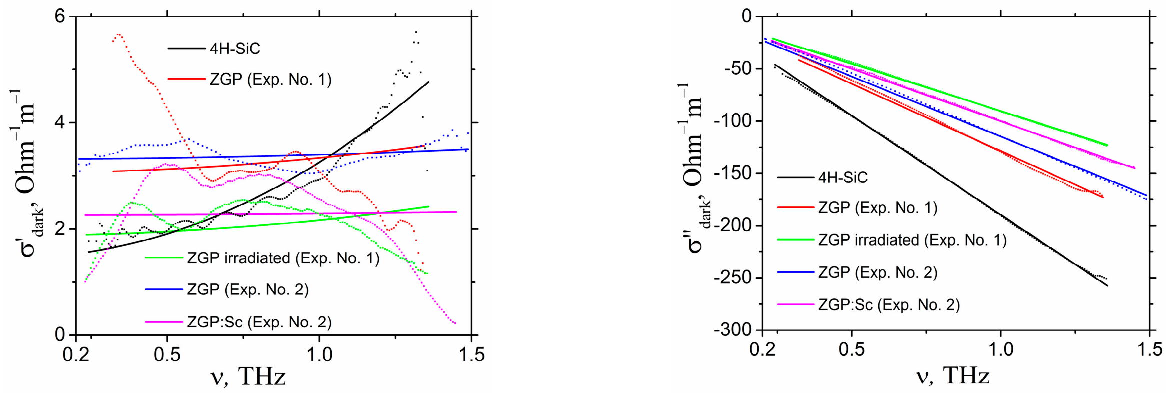


Figure S4. Calculated injection level dependences of efficient charge carrier lifetime with the resolution into contributions from different recombination mechanisms determined for (a) thin and (b) thick slab of electron irradiated $ZnGeP_2$ (Exp. No. 1).



a) b)

Figure S5. The terahertz spectra of (a) refractive index and (b) absorption coefficient of $ZnGeP_2$ (Exp. No. 1), electron irradiated $ZnGeP_2$ (Exp. No. 1), $ZnGeP_2$:Sc (Exp. No. 2), $ZnGeP_2$:Sc (Exp. No. 2) and 4H-SiC crystals.



a) b)

Figure S6. The terahertz spectra of (a) real and (b) imaginary parts of dark complex conductivity measured in $ZnGeP_2$ (Exp. No. 1), electron irradiated $ZnGeP_2$ (Exp. No. 1), $ZnGeP_2$:Sc (Exp. No. 2), $ZnGeP_2$:Sc (Exp. No. 2) and 4H-SiC crystals. Symbols – experimental data, solid lines – Drude-Smith fitting (the parameters are given in Table S1).

Table S1. The Drude-Smith model fitting parameters (for fitting of dark complex conductivity measured in $ZnGeP_2$ (Exp. No. 1), electron irradiated $ZnGeP_2$ (Exp. No. 1), $ZnGeP_2$ (Exp. No. 2), $ZnGeP_2$:Sc (Exp. No. 2) and 4H-SiC crystals).

Sample	L, μm	Δn, cm^{-3}	τ, fs	c_b
ZGP (Exp. No. 1)	202	$2.6 \cdot 10^{21}$	0.17	-1
ZGP (Exp. No. 1) irradiated	202	$8.5 \cdot 10^{20}$	0.25	-1
ZGP (Exp. No. 2)	199	$1.96 \cdot 10^{22}$	0.06	-1
ZGP:Sc (Exp. No. 2)	193	$1.54 \cdot 10^{23}$	0.02	-1
4H-SiC	376	$7.95 \cdot 10^{20}$	0.75	-1