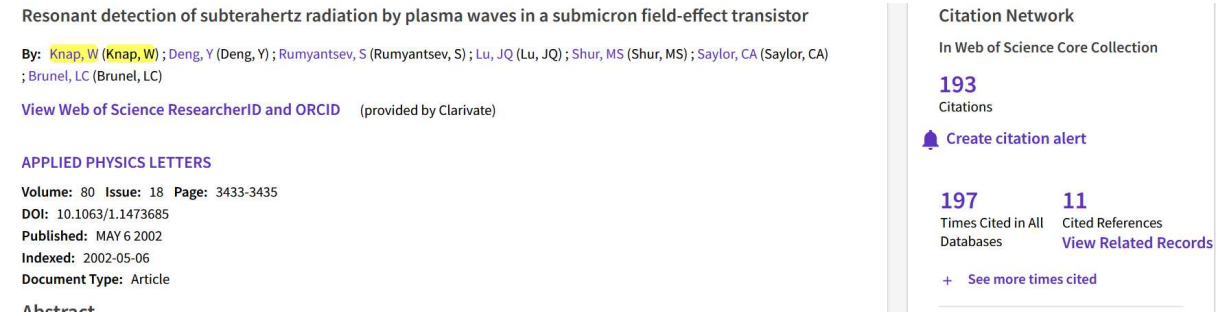
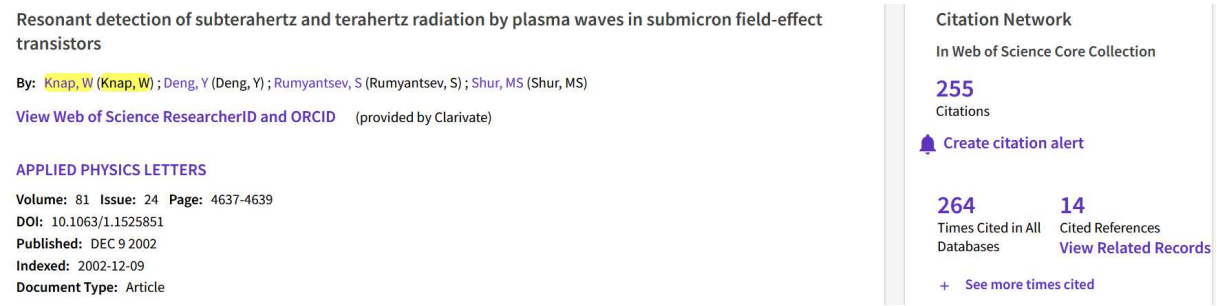
10 Most important publications in the research field of CENTERA-IRA on Terahertz plamonics

[1a] Resonant detection of subterahertz radiation by plasma waves in a submicron field-effect transistor

Knap, W.; Deng, Y.; Rumyantsev, S.; Lü, J. Q.; Shur, M. S.; Saylor, C. A.; Brunel, L. C.,
Applied Physics Letters **2002,**80 (18), 3433-3435.
CITATIONS:193
DOI: 10.1063/1.1473685
https://aip.scitation.org/doi/10.1063/1.1473685



[1b] Resonant detection of subterahertz and terahertz radiation by plasma waves in submicron field-effect transistors
Knap, W.; Deng, Y.; Rumyantsev, S.; Shur, M. S.,
Applied Physics Letters **2002,***81* (24), 4637-4639.
CITATIONS: 255
DOI: 10.1063/1.1525851
https://aip.scitation.org/doi/10.1063/1.1525851

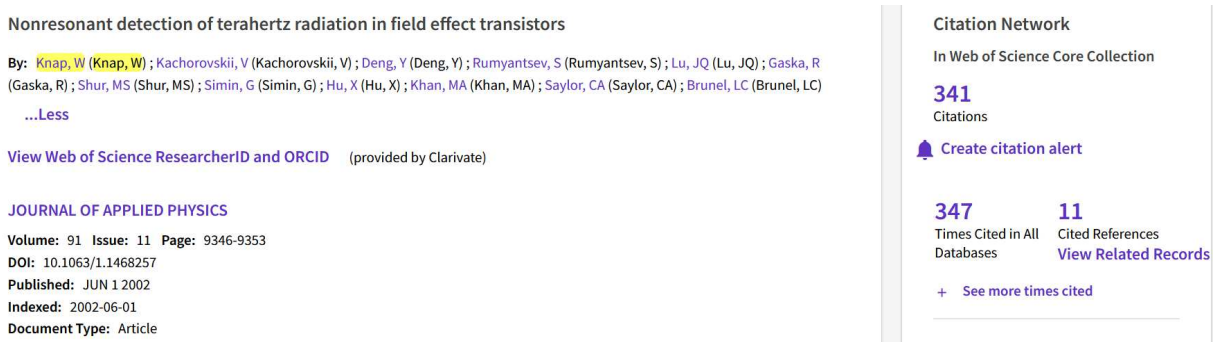


First experimental work showing that submicron field-effect transistor (GaAs – HEMT) can operate as plasma wave detector at sub-THz and THz radiation – this means operate as detectors at frequencies. This is first experimental proof of predictions of Dyakonov and Shur plasma wave theory.

First experimental work showing that submicron field-effect transistor (GaAs – HEMT) can operate as plasma wave detector of sub-THz radiation – this means operate as detectors at frequencies much higher then their electrical cut-off frequencies. For the first time theoretical predictions of Dyakonov and Shur – has been confirmed. This work opened the future for THz imaging systems based on arrays of nano-transistors.

[2] Nonresonant detection of terahertz radiation in field effect transistors
Knap, W.; Kachorovskii, V.; Deng, Y.; Rumyantsev, S.; Lü, J. Q.; Gaska, R.; Shur, M. S.; Simin, G.; Hu, X.; Khan, M. A.; Saylor, C. A.; Brunel, L. C.
Journal of Applied Physics **2002,***91* (11), 9346-9353.

CITATIONS: 341
DOI: 10.1063/1.1468257
https://aip.scitation.org/doi/10.1063/1.1468257



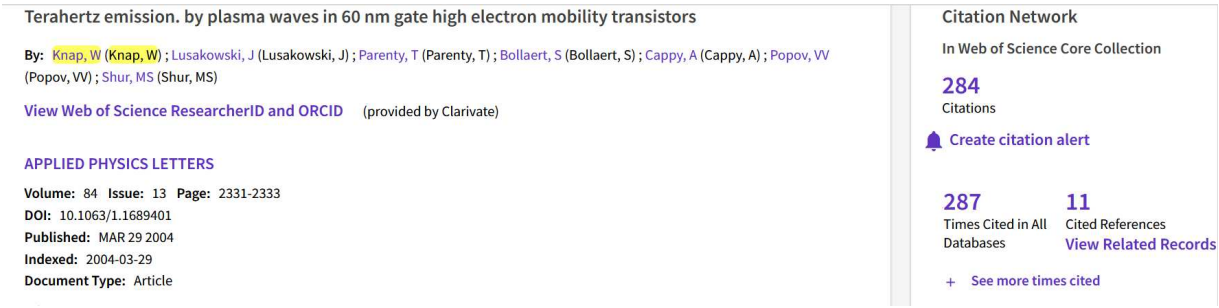
CITATIONS: 341
DOI: 10.1063/1.1468257
https://aip.scitation.org/doi/10.1063/1.1468257

This work presents for the first time complete experimental and theoretical description of plasma wave detection of THz radiation. The work is the basis of the understanding of physical limits of plasma wave rectification in nanostructures. It opens the possibility to interpret results of THz detection experiments on all types of THz plasma wave detectors.

[3] Terahertz emission by plasma waves in 60 nm gate high electron mobility transistors
Knap, W.; Lusakowski, J.; Parenty, T.; Bollaert, S.; Cappy, A.; Popov, V. V.; Shur, M. S.,.
Applied Physics Letters **2004,***84* (13), 2331-2333.

CITATIONS: 284
DOI: 10.1063/1.1689401
https://aip.scitation.org/doi/10.1063/1.1689401

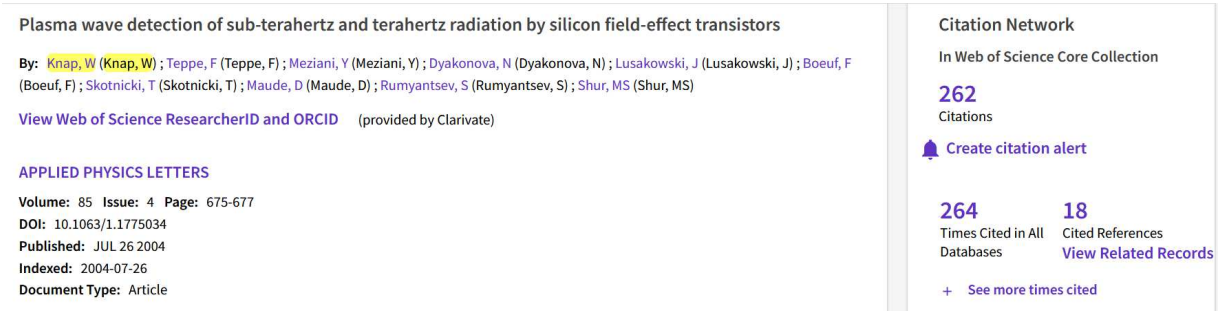
This work presents first experimental proof showing that plasma wave oscillations in nano-transistors may lead to THz emission. Work is done in close collaboration with researchers from University of Warsaw



[4] Plasma wave detection of sub-terahertz and terahertz radiation by silicon field-effect transistors

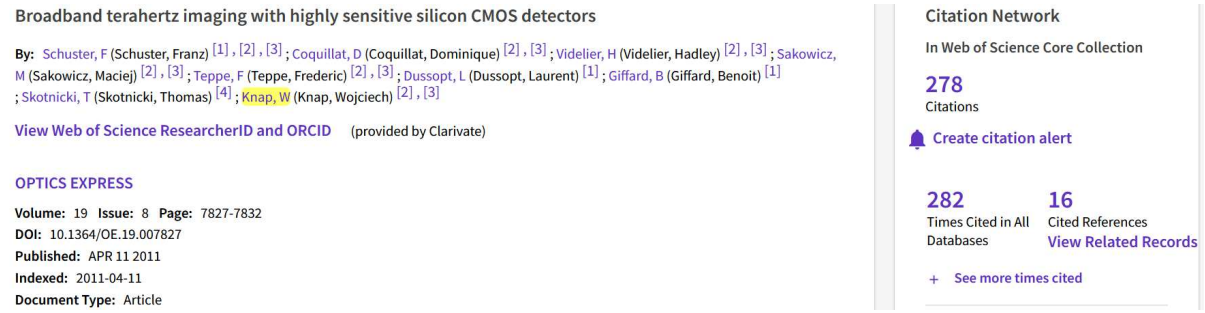
W. Knap, F. Teppe, Y. Meziani, N. Dyakonova, J. Lusakowski, F. Boeuf, T. Skotnicki, D. Maude, S. Rumyantsev, M.S. Shur,
Appl. Phys. Lett. **85**, 675 (2004)

CITATIONS: 262
DOI: 10.1063/1.1775034
https://aip.scitation.org/doi/10.1063/1.1775034



First demonstration that Silicon transistors can detect THz radiation – even if the carrier mobility is one order smaller that in GaAs HEMTs

[5] Schuster, F.; Coquillat, D.; Videlier, H.; Sakowicz, M.; Teppe, F.; Dussopt, L.; Giffard, B.; Skotnicki, T.; **Knap, W.**, Broadband terahertz imaging with highly sensitive silicon CMOS detectors. *Optics Express* **2011,***19* (8), 7827-7832.



CITATIONS: 278

DOI: 10.1364/OE.19.007827

https://opg.optica.org/oe/fulltext.cfm?uri=oe-19-8-7827&id=211658

This work is the first demonstration of use of Plasma Wave Detectors Based on standard Silicon technology for THz Imaging.

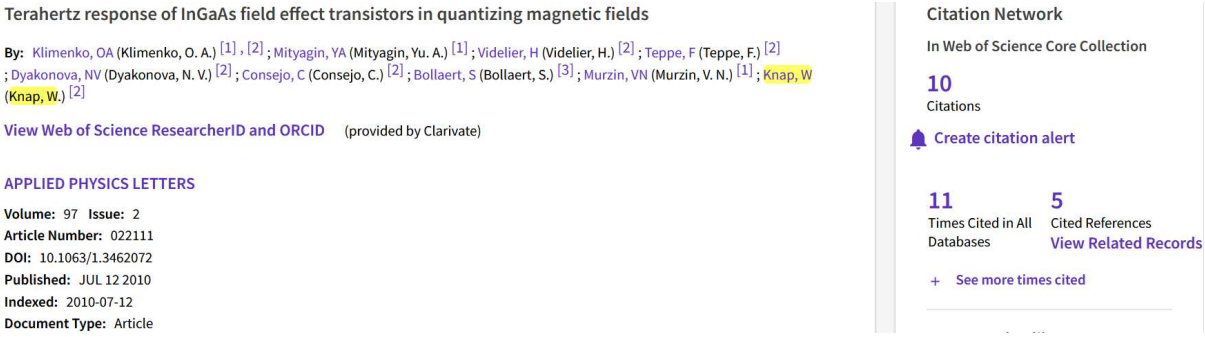
It opens the way for Silicon technology based THZ sensors arrays

[6] Klimenko, O. A.; Mityagin, Y. A.; Videlier, H.; Teppe, F.; Dyakonova, N. V.; Consejo, C.; Bollaert, S.; Murzin, V. N.; **Knap, W**., Terahertz response of InGaAs field effect transistors in quantizing magnetic fields. *Applied Physics Letters* **2010,***97* (2), 22111-22111.

CITATIONS: 10

DOI: 10.1063/1.3462072

https://aip.scitation.org/doi/10.1063/1.3462072



[7] ***Terahertz radiation detection by field effect transistor in magnetic field*****,**

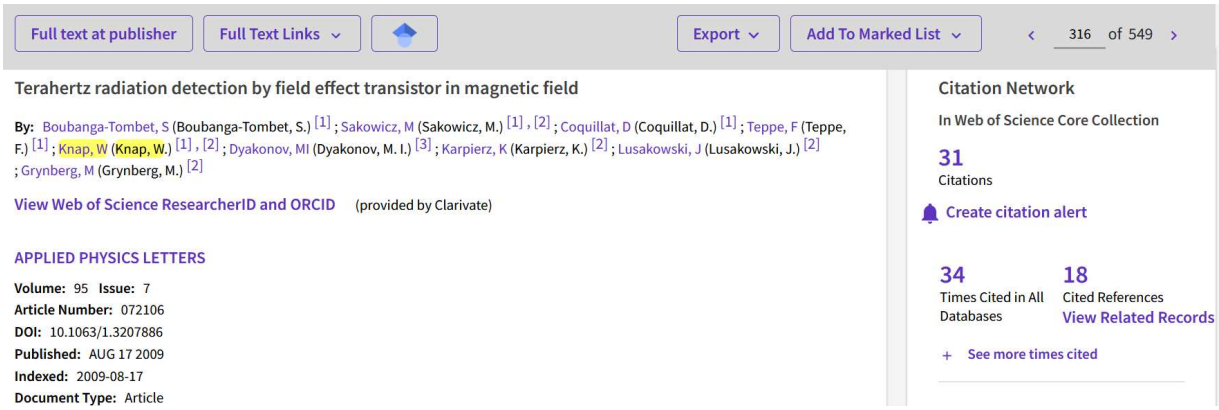
S. Boubanga-Tombet, M. Sakowicz, D. Coquillat, F. Teppe,; W. Knap, M.I. Dyakonov, K. Karpierz, J. Łusakowski, M. Grynberg,

Appl. Phys. Lett. **95**, 072106 (2009)

CITATIONS: 31

DOI: 10.1063/1.3207886

https://aip.scitation.org/doi/10.1063/1.3207886



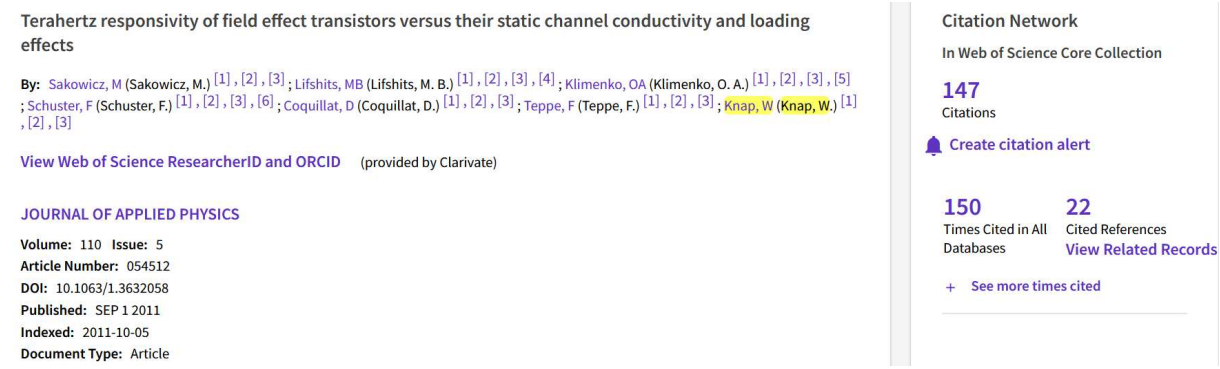
These works [6 , 7] *show final – definitive proof that plasma oscillations are responsible for THz radiation rectification in field effect transistors*

[8] Sakowicz, M.; Lifshits, M. B.; Klimenko, O. A.; Schuster, F.; Coquillat, D.; Teppe, F.; **Knap, W.**, Terahertz responsivity of field effect transistors versus their static channel conductivity and loading effects. *Journal of Applied Physics* **2011,***110* (5), 054512.

CITATIONS: 147

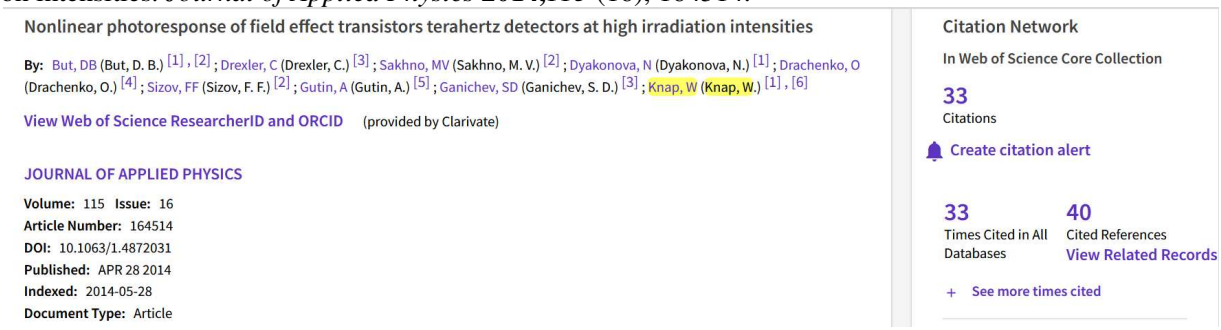
DOI: 10.1063/1.3632058

https://aip.scitation.org/doi/10.1063/1.3632058



In this work for the first time the relation between static (DC) characteristics of nanotransistors and their high frequency (THz) plasma wave response is established. Both theoretical and experimental research presented in this work establish the basis of data interpretation for all researchers studying THz rectification by plasma wave nonlinearity mechanisms.

[9] But, D. B.; Drexler, C.; Sakhno, M. V.; Dyakonova, N.; Drachenko, O.; Sizov, F. F.; Gutin, A.; Ganichev, S. D.; **Knap, W**., Nonlinear photoresponse of field effect transistors terahertz detectors at high irradiation intensities. *Journal of Applied Physics* **2014,***115* (16), 164514.



CITATIONS: 33
DOI: 10.1063/1.4872031
https://aip.scitation.org/doi/10.1063/1.4872031

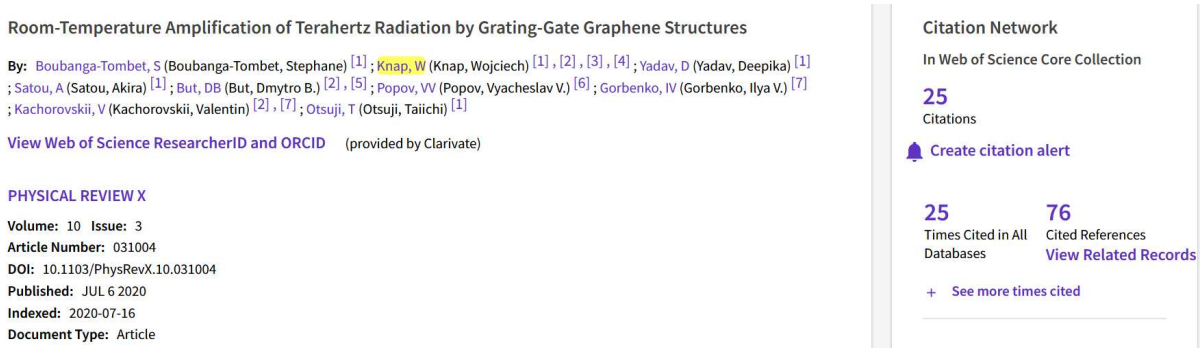
This work presents first experimental studies of the speed and dynamic range of plasma wave THz transistors. It shows high dynamic range and response time below 1ns qualifying these transistors as the best detectors for THz arrays – for THz vison and imaging

[10]Room-Temperature Amplification of Terahertz Radiation by Grating-Gate Graphene Structures,

S. Boubanga-Tombet, **W. Knap**, D. Yadav, A. Satou, D.B. But, V.V. Popov, I.V. Gorbenko, V. Kachorovskii, T. Otsuji,
Phys. Rev. X **10**, 031004 (2020)

CITATIONS: 25
DOI: 10.1103/PhysRevX.10.031004
https://journals.aps.org/prx/abstract/10.1103/PhysRevX.10.031004

This work is the first demonstration of room temperature THz amplification by plasma waves in grating gate graphene transistors. This result is the basis for the ERC project TERAPLASM currently (2023-2028) realized in the CENTERA LABORATORY – International Research Agenda founded in 2019 by Prof.W.Knap (Institute of High Pressure Physics – Polish Academy of Sciences)



Room-Temperature Amplification of Terahertz Radiation by Grating-Gate Graphene Structures

By: Boubanga-Tombet, S (Boubanga-Tombet, Stephane) [1] ; Knap, W (Knap, Wojciech) [1] , [2] , [3] , [4] ; Yadav, D (Yadav, Deepika) [1] ; Satou, A (Satou, Akira) [1] ; But, DB (But, Dmytro B.) [2] , [5] ; Popov, VV (Popov, Vyacheslav V.) [6] ; Gorbenko, IV (Gorbenko, Ilya V.) [7] ; Kachorovskii, V (Kachorovskii, Valentin) [2] , [7] ; Otsuji, T (Otsuji, Taiichi) [1]

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[10] Schuster, F.; Coquillat, D.; Videlier, H.; Sakowicz, M.; Teppe, F.; Dussopt, L.; Giffard, B.; Skotnicki, T.; **Knap, W**., Broadband terahertz imaging with highly sensitive silicon CMOS detectors. *Optics Express* **2011,***19* (8), 7827-7832.

Broadband terahertz imaging with highly sensitive silicon CMOS detectors

By: Schuster, F (Schuster, Franz) [1] , [2] , [3] ; Coquillat, D (Coquillat, Dominique) [2] , [3] ; Videlier, H (Videlier, Hadley) [2] , [3] ; Sakowicz, M (Sakowicz, Maciej) [2] , [3] ; Teppe, F (Teppe, Frederic) [2] , [3] ; Dussopt, L (Dussopt, Laurent) [1] ; Giffard, B (Giffard, Benoit) [1] ; Skotnicki, T (Skotnicki, Thomas) [4] ; Knap, W (Knap, Wojciech) [2] , [3]

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CITATIONS: 278
DOI: 10.1364/OE.19.007827
https://opg.optica.org/oe/fulltext.cfm?uri=oe-19-8-7827&id=211658

This work is the first demonstration of use of Plasma Wave Detectors Based on standard Silicon technology for THz Imaging.

It opens the way for Silicon technology based THZ sensors arrays