PETMEM Newsletter November 2017

Welcome

Welcome to the 4th newsletter from the PETMEM Consortium – keeping you up to date with our activities and general topics of interest. We are on twitter, follow us @petmem2020 to receive all the latest updates.

The PETMEM Project

We are working to develop and characterization new materials as well as the tools required to enable the fabrication of an entirely new low-voltage, memory element and high-speed RF switching chip. This project is tackling the most important barrier currently slowing down the expected evolution of CMOS; that is the fundamental limit on the further lowering of line voltage arising from Boltzmann's law. Power, proportional to voltage squared is not lowered and hence speeding up chip operation would exceed acceptable power consumption, leading to the stasis in speed. The PET technology transduces voltage to stress, activating a facile insulator–metal transition, thereby achieving multi-GHz switching speeds, as predicted by modelling, at lower power than the comparable generation field effect transistor (FET).

Highlights to date

At the month-18 meeting hosted by Max Planck Institute, Dresden, Germany (15-16th June 2017) where the steering committee conducted a strategic review of the target application areas. We concluded that the best chance for early adoption of PETMEM will be through RF switching applications while the memory application (especially with VLSI) will be a longer-term target. By recognizing Europe's strength in the RF sector, the consortium is convinced that the production of a RF switch demonstrator will generate a lot of interest for industrial collaboration (especially within the EU). Already, we have established contact with Prof Peter Aaen of Surrey University-5G centre who has accepted to perform initial microwave testing of the PETMEM RF switch demonstrators.

PETMEM partners @ Dresden, Germany.

On the 26th of June 2017, DCA hosted (in Turku, Finland) the review of the PETMEM project by the European Commission. The consortium requested and received an extension of the project duration from 36 months to 42 months. This extra 6 months will allow the consortium to develop the proposed RF switch demonstrator as well as generation 3 of the PET memory element. In the last 6 months (since M18), the consortium has made a lot of progress which includes the deposition of new PE (PMN-PT) and PR (SmS with RE, Heusler compounds), the traceable measurement of piezoelectric response with DBLI, the high-pressure characterization of PR

PETMEM was at:

Our partners attended the following events in the last 6 months:

June 13-14, 2017: Invited Talk at the "Seagate Pit Stop, Digital Manufacturing" Londonderry, Northern Ireland, UK,

July 3, 2017: Invited talk at the CANES CDT Annual Retreat 2017, Dorking UK.

September 20-21, 2017: Posters and oral presentations at the 20th anniversary of the opening of the XMaS beamline, Grenoble, France.

September 25-26, 2017: Invited talk at the 15th Joint European/Japanese Symposium on Composite Materials, London, UK.

October 15, 2017: BBC Radio 3 broadcast at the Wellcome Collection London.

Meet the PETMEM Team

Our partners will be at the following events in the next 6 months:

January 10-11, 2018: PETMEM Month-24 Consortium meeting at University of Gent, Belgium.

January 12, 2018: PETMEM Public Engagement: Time Unwrapped season at the Kings place, London.

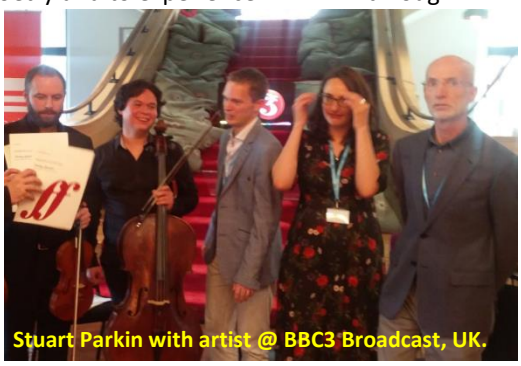
January 15-16, 2018: PiezoMEMS 2018 Workshop, Orlando Florida, USA.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688282


AixACCT's DBLI tool.

materials using Diamond Anvil Cell, the development of characterization tool for thin films of PR material, numerical analysis of electron transmission in PR materials and the realization of the fundamental piezo-actuator required for all PETMEM application paths to generic technologies (Transistor, Memory , RF Switch, Optical devices, & Lateral contact devices). The small spot size of the PE characterization tool developed within the project by aixACCT will be attractive to industry users worldwide where market analysis has identified an increasing demand for this feature. This is due to the shrinking dimensions of devices in the field of MEMS. AixACCT will disseminate and promote their PE tool within the dedicated community of piezoelectric MEMS industry at the piezoMEMS Workshop in Florida in January 2018. They have continued efforts to perform the reliability testing of piezoelectric materials with their new aixHALT setup. AixACCT is also developing a new tool for piezoresistive characterization including temperature capability.

The PETMEM Consortium have partnered with Poet in the City and Aurora Orchestra (both in London) to engage the public about the possibilities of the PETMEM technology. Through a collaboration between poet Frances Leviston, composer Martin Suckling and the scientists working on the PETMEM technology, new works (music & poetry) have been created to construct new pathways for the wider public to explore and understand this new technology. On the 15th of October 2017, the artists launched their new work with celebrated scientist Stuart Parkin in a live BBC Radio 3 broadcast at the Wellcome Collection London as part of a Memory Weekender. Over 200,000 people listened to the lunchtime radio broadcast of the PETMEM musical score where the artists (influences by works of Dickinson and the Schubert quintet) applied pressure to classical music and poetry with scientific reflections from experimental physicist Stuart Parkin. In January 2018, a public recital of the musical score will take place at the Kings Place London, where the public have another chance of experiencing the unique piece of music, poetry and to experience PETMEM through interaction with the consortium who will mostly be in attendance. The consortium will continue to work on the planned tasks during the next stages of the research with a device demonstrator expected within 6 months.


Stuart Parkin with artist @ BBC3 Broadcast, UK.

January 15-16, 2018: MEMS 2018 Conference, Belfast Ireland.

PETMEM Publications

H. Nakamura, I. Rungger, S. Sanvito, N. Inoue, J. Tominaga and Y. Asai, Nanoscale 9, 9386 (2017).

X. Zhong, I. Rungger, P. Zapol, and O. Heinonen, J. Comput Eletron (5 September 2017).

M. A. ElGhazali, P. G. Naumov, H. Mirhosseini, V. Süß, L. Müchler, W. Schnelle, C. Felser, and S. A. Medvedev, Phys. Rev. B 96, 060509(R) – Published 30 August 2017.

P. G. Naumov, K. Filsinger, S. I. Shylin, O. I. Barkalov, V. Ksenofontov, Y. Qi, T. Palasyuk, W. Schnelle, S. A. Medvedev, M. Greenblatt, and C. Felser, Phys. Rev. B 96, 064109 – Published 16 August 2017.

J. B. J. Chapman, O. T. Gindele, C. Vecchini, P. Thompson, M. Stewart, M. G. Cain, D. M. Duffy, and A. V. Kimmel, J. Am. Ceram. Soc., vol. 5, pp. 1–9, Sep. 2017.

Learn more:

Please visit our website (www.petmem.eu) for more information. Please follow us on twitter (@petmem2020).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688282