



**DEPARTMENT OF THE AIR FORCE
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH (AFMC)
EUROPEAN OFFICE OF AEROSPACE
RESEARCH AND DEVELOPMENT (EOARD)**

8 July 2020

MEMORANDUM FOR RECORD

SUBJECT: Missing Final Technical Report for FA9550-16-1-0576

1. No Final Technical Report has been obtained for grant number FA9550-16-1-0576. The PI for this grant, Prof. Wolfgang Haase, passed away in 2018 without having submitted a final technical report. I attempted to obtain a copy of the report from his colleagues at TU Darmstadt, Ms. Claudia Jochem and Dr. Valeriy Lapanik, who were both very helpful and responsive. Unfortunately, neither had access to Prof. Haase's files where it is believed he kept the technical information and any unsubmitted reports.
2. The title for this research project was "Nanocomposites based on Ferroelectric Crystals and Solid State Ferroelectrics" and the grant's objective was to describe how ferroelectric liquid crystalline matrices are influenced by dispersing ferroelectric solid state nanoparticles. Using liquid crystal optical devices, nanocolloidal materials were investigated using electro-optical and dielectric methods. The interaction of the vector of polarization of the dispersed nanoparticles with the spontaneous polarization of ferroelectric liquid crystals was also investigated.
3. Although a final report was not published, research from the PI and his research team was reported in peer-reviewed journal articles. The following three articles are recommended for those interested in the results of related studies.
 - a. R. K. Shukla, D. R. Evans & W. Haase (2016) Ferroelectric BaTiO₃ and LiNbO₃ nanoparticles dispersed in ferroelectric liquid crystal mixtures: Electrooptic and dielectric parameters influenced by properties of the host, the dopant and the measuring cell, *Ferroelectrics*, 500:1, 141-152, DOI: [10.1080/00150193.2016.1215206](https://doi.org/10.1080/00150193.2016.1215206).
 - b. Valeri Lapanik, Sergei Timofeev, Genadz Sasnouski, Vladimir Bezborodov & Wolfgang Haase (2017) Fast-switching effect using viscous chiral-nematic materials, *Liquid Crystals*, 44:2, 297-302, DOI: [10.1080/02678292.2016.1196757](https://doi.org/10.1080/02678292.2016.1196757).
 - c. Valeri Lapanik, Genadz Sasnouski, Sergei Timofeev, Elena Shepeleva, Gennadiy Evtyushkin & Wolfgang Haase (2018) New highly anisotropic liquid crystal materials for high-frequency applications, *Liquid Crystals*, 45:8, 1242-1249, DOI: [10.1080/02678292.2018.1427810](https://doi.org/10.1080/02678292.2018.1427810).
4. Any questions related to this grant should be sent directly to me. I can be contacted via phone at DSN 314-235-6010 or by email at jason.foley.1@us.af.mil.

JASON R. FOLEY, PhD, DAF
International Program Officer, Materials &
Physics

MEMORANDUM FOR RECORD

I approved the waiver for technical reports for this particular grant to DTIC as the afore-signed program manager has demonstrated due diligence in his attempt in obtain the required deliverable documents. This is in accordance with AFRLI 61-201 dated 9 February 2016 and AFRL guidance regarding unobtainable deliverables.

D. BRENT MORRIS, Colonel, USAF
Commander