Infrastructures 1216								
RIF PROPOSAL NUMBER	TITLE	COORDINATOR	HOST ORGANIZATION	PARTNER ORGANIZATION	FOREING RESEARCH ORGANIZATION	PROGECT BUDGET	RIF FUNDING	PUBLISHABLE SUMMARY
INFRASTRUCTURES/1216/0004	SOLUTION-PROCESSED OPTOELECTRONIC NANOMATERIALS	Georgios Itskos	University of Cyprus	PA1: Cyprus University of Technology		999.868,00	999.868,00	Solution-processed materials satisfy the demand for inexpensive and large area manufacturing such as printing, with versatility that allows their integration, deposition or mixing with various surfaces and matrixes including flexible and transparent substrates. Among the library of solution-processed materials, hybrid organic-inorganic halide perovskites emerged recently as outstanding energy materials. On a different field, the discovery of size-dependent effects at the nanoscale triggered a great interest in colloidal nanomaterials, allowing nowadays the synthesis of robust nanostructures with precise size control, elaborate shapes and plethora of optoelectronic applications. The program NANOSONICS aims to exploit the synergies of the two technologies to produce active layers for high performance light harvesting and light emitting devices based on solution-processed colloidal perovskite nanomaterial (CPN) building blocks. There has been an emergence of successful demonstrations of CPNs, yet there is a lot of room for improvement towards their functionalization into device-ready closed-packed solids. The field can greatly benefit from a systematic rational approach based on state-of-the-art synthetic, processing and characterization approaches. The initial objective will be to thoroughly understand the basic material properties of CPNs and probe their stability under ambient conditions. We will then employ various functionalization routes to produce electronic-active solids and optimize their light harvesting, light emitting and light amplification properties towards efficient electro-optical devices.
INFRASTRUCTURES/1216/0009	Platform for Biosciences and Human Health in Cyprus: MicroCT Enabled and Synchrotron Radiation Enabled Analyses	Kirsi Lorentz	The Cyprus Institute	PA1: University of Cyprus PA2: Erevnitiko Idryma P. L. PA3: Bank of Cyprus Oncology Centre PA4: European University - Cyprus Ltd PA5: Medochemie ltd PA6: Ministry of Agriculture, Rural Development and Environment PA7: The Cyprus Institute of Neurology and Genetics	FRO1: Elettra Synchrotron FRO2: SESAME Synchrotron FRO3: European Synchrotron Radiation Facility (ESRF) FRO4: SOLEIL Synchrotron FRO5: University of Durham FRO6: University of Bradford	999.964,00	999.964,00	Human health research requires ever more sophisticated infrastructures to allow cutting edge science to take place within the relevant domains of biosciences, biomedical sciences and technology, including bioarchaeology. In recent years, vast infrastructures, such as multi-national synchrotron facilities have begun to be used increasingly in researching human health, both ancient and modern. Increasingly sophisticated high-resolution imaging has opened up new research directions for diagnosis of disease as well as development of safe and effective pharmaceuticals. This project will create a new distinct research unit (platform) focused on biosciences and human health, both ancient and modern, with the acquisition of a micro computed tomography (microCT) facility – a research infrastructure not yet available in Cyprus, but crucial to the study of human health. In addition to the cutting edge, laboratory based high-resolution 3D imaging, at micrometre scales, of both modern and ancient human tissue and remains, pharmaceutical compounds and products, and laboratory animals, critical in human health research, the microCT will open doors for Cypriot researchers and research groups to access multi-national cutting-edge research facilities, synchrotrons, allowing even higher resolution studies, and research requiring phase contrast. The new research unit shall pursue high-level frontier research in the domains of biosciences, as well as biomedical sciences and technology. The project has applicability to two specific focus areas of the Health Priority Sector of the Cyprus Smart Specialisation Strategy: the diagnosis of diseases in Cypriot populations (ancient and modern), contemporary methods of imaging, and exposure to environmental conditions; as well as safe and effective pharmaceuticals. Further, through the case study components on ancient human health, the project contributes towards an additional focus area, namely the conservation, promotion and exploitation of cultural heritage.
INFRASTRUCTURES/1216/0017	IRIDA Research Centre for Communication Technologies	Ioannis Krikidis	University of Cyprus		FRO 1: University of Patras	1.000.000,00 €	1.000.000,00 €	The aim of the proposed project is to develop the IRIDA Research Centre for Communication Technologies, an inspiring environment for conducting basic and applied research and innovation in the area of wireless communications and digital signal processing. Wireless communication technology under the umbrella of the fifth-generation (5G) of mobile networks will impact our life more than any other telecommunication standard in the past and is expected to become key enabler for new services, applications, and markets. From an engineering perspective, 5G systems will bring a much greater throughput to support applications with high mobile data traffic, ultra-high reliability to enable real-time mobile control, and high connection density to support massive machine type communications. These fundamental characteristics are essential for the operation of any modern engineering system and introduce communication technologies as a research area with significant social, economic and environmental impact. The tools and methods of the IRIDA Research Centre are applied to two key priority areas identified by the Cyprus Smart Specialization Strategy i.e., Energy (smart micro-grids) and Transportation (Intelligent transportation systems).
INFRASTRUCTURES/1216/0032	Environmental Microbiology and Biotechnology Centre	Michalis Omirou	Ministry of Agriculture, Rural Development and Environment	PA1: The Cyprus Institute PA2: The Cyprus Institute of Neurology and Genetics	FRO1: INRA	895.344,75	895.344,75	The overall aim of the proposed project is to establish a state-of-the-art environMentAl microbioloGy aNd biotEchnology cenTre (MAGNET) for the exploitation of native soil microbial diversity aiming at: (a) producing a reliable facility for acquisition, storage and characterization of soil genetic resources and (b) make these resources available for the whole scientific community and policy-makers. To achieve this, the proposed Infrastructure Centre will combine, integrate and validate a range of existing advanced technologies, methodologies and approaches, which are: (i) extensive sampling, storage and conservation of soils, soil microbes (pure cultures and DNA) from pristine and agricultural ecosystems; (ii) high-throughput sequencing and phenotypic screening; (iii) information system for the integration of genomic and soil satellite information data with ecosystems and (iv) evaluation of specific microbial inocula explicitly dedicated to Cyprus agriculture.
INFRASTRUCTURES/1216/0034	Establishing the Center for Cellular Plasticity: setting cornerstones in Disease Modeling and Regenerative Medicine	Katerina Strati	University of Cyprus	PA1: BiQ Laboratories Limited		1.007.996,00	999.596,00	Basic stem cell research and related industry is one of the most prominent areas of biology anticipated to continue rapid growth in the next decades. Nevertheless, Cyprus has no infrastructure to support basic and translational research in the field of stem cells and cellular plasticity. We aim to establish the first such infrastructure: The Centre for Cellular Plasticity (CCP). This centre will act as a nucleus for researchers interested in research on cellular plasticity and at the same time provide access to expertise and equipment which are currently unavailable to the research community of Cyprus, including access to a user-friendly flow sorter. This project describes the establishment of the CCP via the pursuit of cutting edge research evaluating the importance of cellular stemness in viral-mediated oncogenesis. Cancer cells and stem cells share long recognized common features, such as an infinite lifespan and longer telomeres. In the last decade there has been rapid progress made in the stem cell field in the aftermath of the pioneering discovery of cellular reprogramming which defined methodologies to dedifferentiate specialized, differentiated cells to pluripotent stem cells. This technology has generated new prospects for producing improved in vitro models for research and bypassed important hurdles to the objective of regenerative therapy. CCP is focused on elucidating the role of pluripotency related factors, such as those involved in the cellular reprogramming process in HPV related malignancies which account for 5% of the worldwide tumor burden. While the action of such factors was previously thought to be restricted to pluripotent cells they have recently been shown to be implicated in some types of carcinogenesis where they could potentially serve as a useful biomarkers. Our work could shed light on new avenues on the diagnosis and therapy of such diseases.

INFRASTRUCTURES/1216/0042	Advanced RF Electronics Centre for Adaptive Metamaterials	Marco Antoniades	University of Cyprus	PA1: Frederick Research Center PA2: Open University of Cyprus PA3: Signal Generix LTD PA4: Cyprus University of Technology PA5: Sigint Solutions Limited	FOR 1: Delft University of Technology FOR 2: Massachusetts Institute of Technology	1.007.060,00	999.992,00	RF-META will establish a new, distinct research centre focusing on the development of advanced RF electronics for use in adaptive metamaterial technology. Through the development of cutting-edge research infrastructure, and the employment of highly-skilled scientists in this field, a path towards establishing a unique Centre of Excellence in Cyprus will be laid, that will serve the entire island and the surrounding region. The RF-META research centre will be hosted at the University of Cyprus, and will be led by Dr. Marco Antoniades, a young early-career scientist who is an internationally recognized expert in the field of RF metamaterials. The centre will bring together a diverse research team consisting of other faculty members and researchers from the University of Cyprus research collaborators from the Frederick Research Centre, the Open University of Cyprus, the Cyprus University of Technology, the University of Birmingham, and two industrial SME research partners: SignalGeneriX Ltd and SiGINT Solutions. RF-META will establish a modern design and test facility, where key infrastructure targeting the mm-wave region will be acquired and installed, such as a laser milling machine, inkjet and 3D printers, a wafer probe station, a vector network analyzer, and an RF anechoic chamber. This will provide a significant new contribution to the research facilities of Cyprus, and will enable research to be conducted in the emerging fields of wireless and photonic communications. The centre will also develop a critical mass of researchers (4 PhD students), who will be instrumental in developing innovative technology demonstrators that will have applications in several Focus Areas of the designated Priority Sectors of the Smart Specialisation Strategy for Cyprus (S3Cy), primarily in the Priority Sectors of Tourism and Transport-Shipping.
INFRASTRUCTURES/1216/0043	Advanced centre for testing degradation and failures in new and emerging solar cells	Maria Hadjipanayi	University of Cyprus		FRO1: INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM IMEC VZW (IMEC) FOR2: AIT Austrian Institute of TechnologyGmbH (AIT) FOR3: Max-Planck Institute for the Science of Light	999.460,00	999.460,00	Since solar cells tend to degrade after a specific time of operation, characterization methods are more than necessary for the failure analysis of PV cells. New and emerging technologies such as perovskites and perovskite on silicon tandems, demand more advanced characterization methods for understanding degradation mechanisms occurring therein and subsequently contributing to improvement of their properties which can lead to their commercialization. The proposed work aims to characterize such cells indoors with several optoelectronic techniques as well as outdoors at real operating conditions for the detailed analysis of degradation mechanisms. This highlights the importance of developing a dedicated laboratory and key collaborations for addressing complex and multiple failures in perovskites-based cells in a full top-down, holistic approach. Methods of Light Beam Induced Current (LBIC), Dark Lock-In Thermography (DLIT), Lock-in Thermography (LIT), spatially-resolved Electroluminescence (EL) and Photoluminescence (PL) are expected to be setup for a complete optical and electrical characterization of cells. These methods in combination with ultrafast spectroscopy and Raman measurements and other microscopic-spectroscopic techniques such as Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), X-ray Photoelectron Microscopy (XPS) and Energy-dispersive X-ray spectroscopy (EDX) will provide a detailed failure analysis in the perovskite-based cells. The overall project pursue to the improvement of the stability and efficiency of perovskite and perovskite on silicon tandem cells and also to the creation of a new infrastructure unit for tests of emerging technology cells with significant capabilities that is absent in Cyprus and in Europe generally.
INFRASTRUCTURES/1216/0052	Center for Preclinical Evaluation and Optimization of Cancer Nanomedicines	Triantafillos Stylianopoulos	University of Cyprus	PA1: Cyprus University of Technology PA2: E.U.C. Research Center Ltd PA3: Theramir Ltd	FRO1: Massachussets General Hospital/Harvard Medical School FRO2: University of Washington	995.812,00	995.812,00	In the proposed project, we will establish the Center for Preclinical Evaluation and Optimization of Cancer Nanomedicines with the aim to test the efficacy of nanoparticle formulations at the preclinical stage. Furthermore we plan to develop expertise to functionalize the nanoparticles with anti-fibrotic agents that we have recently shown to make the tumor less stiff, improving tumor perfusion and thus, the delivery of nanoparticles. Two pieces of equipment will be obtained: an advanced ultrasound imaging system for quantification of tissue elasticity and perfusion and a whole-body animal imaging system for non-invasive in vivo measurements of nanoparticle distribution. The Center aims to a) propose new solutions to optimize personalized treatment efficacy of nanoparticles, b) identify ways for transferring the products of this research to the clinical setting, c) extent collaborations with national and international research institutes and d) explore further funding opportunities for active continuation beyond the duration of the proposed project. Finally, the Center will aim to provide services to nanomedicine companies for the evaluation and optimization of their products. Other specific objectives of the proposed project include the development of two specialized multifunctional nanoparticle drug delivery systems equipped with both anti-fibrotic and cytotoxic agents. Additionally, the project aims to the development of a perfusion biomarker which will relate tumor perfusion to the degree of intratumoral drug delivery. The perfusion biomarker will be integrated into a software product compatible with ultrasound imaging systems. The eventual goal of this product will be the establishment of a clinically relevant biomarker to predict tumor response to treatment and thus, differentiate tumors to responders or non-responders. The software will also provide guidelines for optimal systemic administration of nanoparticles to the tumor based on the perfusion biomarker.
INFRASTRUCTURES/1216/0060	The center for mechanobiology research	Paris Skourides	University of Cyprus	PA1: The Cyprus Institute of Neurology and Genetics	FOR1: Kings College London FOR2: The Rockefeller University	995.600,00	995.600,00	The major objective of the Mechanobiology Center is to elucidate the fundamental nature of how cells sense and respond to mechanical stimuli, and to employ the principles revealed by these studies for biomedical applications and in regenerative medicine. Mechanical forces play a role in a wide range of biological phenomena including embryonic morphogenesis, differentiation, apoptosis, proliferation, wound healing and many other clinically relevant topics. At the same time aberrant mechanical signaling underlies important diseases such as tumor growth and metastasis, atherosclerosis, heart failure, osteoarthritis and glaucoma. The Mechanobiology Center will bring together a strong highly interdisciplinary team composed of leading local and international researchers consolidating both the infrastructure as well as the human capital of the island related to mechanobiology. In addition it will introduce a variety of cutting edge modalities not currently available in Cyprus including supperresolution microscopy, optical traps, magnetic tweezers, computerized cell stretching and microfabrication technologies while at the same time develop new tools and technologies for the study of the influences of mechanical stimuli on cells and tissues. Our overarching goal is to decipher how cells and tissues sense and respond to forces and to the mechanical properties of their native environments and exploit this knowledge to develop new screening assays as well as therapeutic and diagnostic approaches for a variety of diseases with an emphasis on cancer and metastasis.

INFRASTRUCTURES/1216/0070	Nanoparticle/Nanomaterial Synthesis and Characterization Laboratory	George Biskos	The Cyprus Institute	PA1: University of Cyprus	FRO 1: ETH-EMPA	999.960,00	999.960,00	The objective of this project is to develop a modern infrastructure for synthesizing and characterising nanoparticles (NPs) and nanomaterials (NMs) for applications in a wide range of areas. The infrastructure will be equipped with state-of-the-art gas-phase systems for synthesizing NPs and NMs as well as state-of-the-art instruments for online and offline characterisation. Compared with conventional techniques, NP/NM synthesis in the gas phase offers many advantages: i) they are environmentally-friendly since they do not require precursor compounds and do not produce waste streams, ii) they are continuous process with high repeatability that can be easily incorporated in industrial processes, and iii) can be easily combined with state-of-the-art additive manufacturing (i.e., 3D printing) techniques to yield novel materials. From the research view point, the greatest advantage of gas-phase synthesis is that it can produce NPs that are extremely pure and surfactant-free in a highly controllable manner. Once all the tools of the infrastructure are operational, we will employ them to develop NMs for gas sensors and catalysts. In the first case we will develop a highly sensitive H2 sensor that can be operated over a wide range of concentrations. By varying the size and composition of the NP building blocks of the NM we will be able to tune both the sensitivity and the operational range of the sensor. In the second case we will use the facility to develop catalysts for converting natural gas and biogas to value-added fuels. The development of the catalyst will be coupled with theoretical investigations, which together with the capabilities to control the structure and composition of the NMs will be used to understand and optimize their performance.
NFRASTRUCTURES/1216/0050	Cyprus Continuously Operating Natural Hazard Monitoring and Prevention System	Christodoulos Danezi	Cyprus University of Technology		FRO 1: GERMAN AEROSPACE CENTER (DLR)	999.280,00 €	999.280,00 €	The proposed research infrastructure (RI) involves the development of a strategic research unit that will study and analyse solid earth processes in Cyprus. Specifically, the proposed RI will utilize novel space technologies, including cutting-edge European space missions, such as Galileo and Copernicus Sentinel-1, and state-of-the-art processing techniques to monitor and potentially mitigate the effects of natural hazards, such as earthquakes, landslides, tsunamis, and assess their impact on the built environment and cultural heritage landmarks. The latter will be achieved by estimating ground deformation and its velocity gradients with high accuracy at a national and regional level. The determination of deformation will be carried out by means of integrated GPS/GNSS and InSAR techniques. Ergo, the system will be comprised of two main segments: (a) a multi-parametric network (MPN), and (b) a control and processing center (CPC). The MPN will collect real-time information from a network of Continuously Operating GPS/GNSS Reference Stations (CORS), weather stations, tilt meters. The network will also include an array of Corner Reflectors (CR) to boost the accuracy of InSAR techniques in estimating deformation. The later will be designed and developed to adapt to the requirements set by the strategic position of Cyprus in cooperation with the German Aerospace Agency (DLR). The MPN will augment and densify existing infrastructure operated by the local stakeholders to deliver robust geodynamic/ geophysical monitoring, and promote the accuracy of local positioning infrastructures. The CPC will perform both real-time and post-processing analysis of the available sensor information and will issue of warnings in case of abrupt or highly-dynamic phenomena, hazard and risk maps, environmental information and web services. Evidently, the proposed RI will enable multi-disciplinary pure and applied research, open new positions, and promote public safety, sustainability and smart growth in the Cypriot region.