

ORGANIZERS



ASSOCIAZIONE
ITALIANA
PER LA RICERCA
INDUSTRIALE



SAPIENZA
UNIVERSITÀ DI ROMA

Renaissance Cloister by Sangallo
Faculty of Civil and Industrial Engineering

SEPTEMBER **19-23** 2022

Nano 2022 Innovation

Conference & Exhibition



CO-ORGANIZERS



Seeing beyond

Consiglio Nazionale delle Ricerche

CSGI

DISTRETTO TECNOLOGICO
SICILIA MICRO E NANO SISTEMI
S.C.A.R.L.

FONDAZIONE
BRUNO KESSLER



INSTITUTIONAL
PARTNERS



IN COOPERATION
WITH



www.nanoinnovation2022.eu

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STAMPA: TIPOGRAFIA PALOMBINI & LANCI S.R.L.

PROGETTO GRAFICO E SITO WEB: AZIMUTH DI PATRIZIA DE CASTRO

Institutional Patronages



Ministero degli Affari Esteri
e della Cooperazione Internazionale



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DELLA
CULTURA



MINISTERO
DELLA DIFESA



MITD

MINISTRO
PER L'INNOVAZIONE TECNOLOGICA
E LA TRANSIZIONE DIGITALE

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agricole alimentari e forestali



MINISTERO DELLA
TRANSIZIONE ECOLOGICA



REGIONE
LAZIO

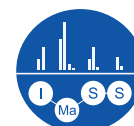
Scientific Patronages



PER CONTINUARE...
BIOLOGI
IL RINNOVAMENTO...



IYBSSD2022
International Year
of Basic Sciences
for Sustainable Development



SISM

Italian Society for Microscopical Sciences



Società Chimica Italiana



Poster Session

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The Role of SAPs and hybrid SAP-PNAs in the Fabrication of a Synthetic Erythrocyte
- 33** Alice GUALERZI, *Fondazione Don Carlo Gnocchi Onlus*
Blood-derived Extracellular Vesicles are potential biomarkers of response and recovery after stroke
- 34** Alexandru-Milentie HADA, *Babes-Bolyai University, RO*
Highly-sensitive C-reactive protein detection based on the selective aggregation of aptamer-conjugated silver nanoparticles
- 35** Farid HAJAREH HAGHIGHI, *Sapienza Univ. of Rome*
Synthesis and characterizations of highly stable magnetite-silver ($\text{Fe}_3\text{O}_4\text{-Ag}$) nanohybrid for recyclable antibacterial materials
- 36** Razieh IZADI, *Sapienza University of Rome*
Mechanical Characteristics of Carbon Nanotubes: Micropolar Elasticity Models and Molecular Dynamics Simulations under Torsion and Bending
- 37** Somayeh KHANI, *Clausthal Univ. of Technology, DE*
Plasticity Investigation of Pure Aluminum Using Multiscale Simulation Approach
- 40** Francesca LIMOSANI, *ENEA*
Lithium Fluoride and Smart Microgels for Innovative Fluorescent Nuclear Track Detectors in Radiobiology
- 41** Antonella MACAGNANO, *CNR-IIA*
TERRE PROJECT: multifunctional nanofibrous systems to control and reduce environmental impacts in agricultural systems
- 42** Mallikarjun MADAGALAM, *Polytechnic University of Turin*
Ferrite-based Nanoparticles: Synthesis, Characterization, and Non-Enzymatic Electrochemical Sensing Applications
- 43** Nouredine MAHDHI, *Tunis El Manar University, TN*
Effect of TiO_2 Nanoparticles on Capillary-Driven Flow in Water Nanofilters Based on Chitosan Cellulose and Polyvinylidene Fluoride Nanocomposites
- 44** Emiliana MANSI, *ENEA*
Restoration of exterior artworks by 3D printing and nanomaterials
- 45** Elena MAZZINELLI, *University Cattolica del Sacro Cuore*
Development of an oral mucosa model useful to characterize drug delivery systems for the oral lichen planus treatment
- 46** Chiara MEAZZINI, *University of Milano*
Extemporaneous preparation of fixed-dose combination orodispersible films by hot melt ram extrusion 3D printing
- 47** Daniele MIRABILE GATTIA, *ENEA*
Mg-based materials as anode for Li ion cells
- 48** Daniele MIRABILE GATTIA, *ENEA*
Superferritic-type alloy for fabrication of heat exchangers by Additive Manufacturing
- 49** Daniele MIRABILE GATTIA, *ENEA*
Realization of heat exchangers in composite materials and metal alloy by AM
- 50** Maria MONTANINO, *ENEA*
Ink formulation for gravure printed Lithium-ion batteries
- 51** Lucia MONTENEGRO, *University of Catania*
In Vitro Evaluation of Topical Vehicles containing Bemotrizinol loaded Lipid Nanoparticles
- 52** Amelia MONTONE, *ENEA*
Pyroelectric device of ZnO ceramics as thermal energy harvesting
- 53** Karine MOUGIN, *The Mulhouse Materials Science Institute (IS2M), FR*
Toward the development of sensors and actuators by 4D printing
- 54** Asma NOSHAD, *Bacha Khan University Charsadda, PK*
Metal based nanopesticides-A green approach towards sustainable agriculture
- 55** Elena OLIVIERI, *Roma Tre University*
Functionalized gold nanorods as promising carrier for antiviral drugs
- 56** Ilaria OTTONELLI, *University of Modena and Reggio Emilia*
Retinal Targeted Hybrid Nanomedicines Loaded Into An Injectable Thermosensitive Hydrogel For Inherited Retinal Degeneration
- 57** Francesco PATITUCCI, *University of Calabria*
Molecularly Imprinted Polymers (MIPs) as carriers for Mannose-targeting delivery of 5-FU
- 58** Federico PAZZAGLIA, *Sapienza University of Rome*
2D material deterministic stacking exploiting scalable transfer techniques
- 59** Giulia PEDRIZZETTI, *Sapienza University of Rome*
Microstructural and hardness studies of ZrO_2 reinforced NiP nano-composite coatings for anti-erosion and anti-wear applications
- 60** Silvia PICCIOLINI, *IRCCS Fondazione Don Carlo Gnocchi Onlus*
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- 61** Lorenzo PIN, *CNR-ISB*
A rapid shotgun metagenome protocol based on Oxford Nanopore Technology applied to soil biodiversity analysis
- 62** Valentina PROTA, *ISS*
Investigation of nanoplastic biological effects on Caco-2 cells

Multifunctional Nanofibrous Systems to Control and Reduce Environmental Impacts in Agriculture

2022-2024

TERRE



SISTEMI MULTIFUNZIONALI NANOFIBROSI PER CONTROLLARE E RIDURRE GLI IMPATTI AMBIENTALI NEI SISTEMI AGRICOLI



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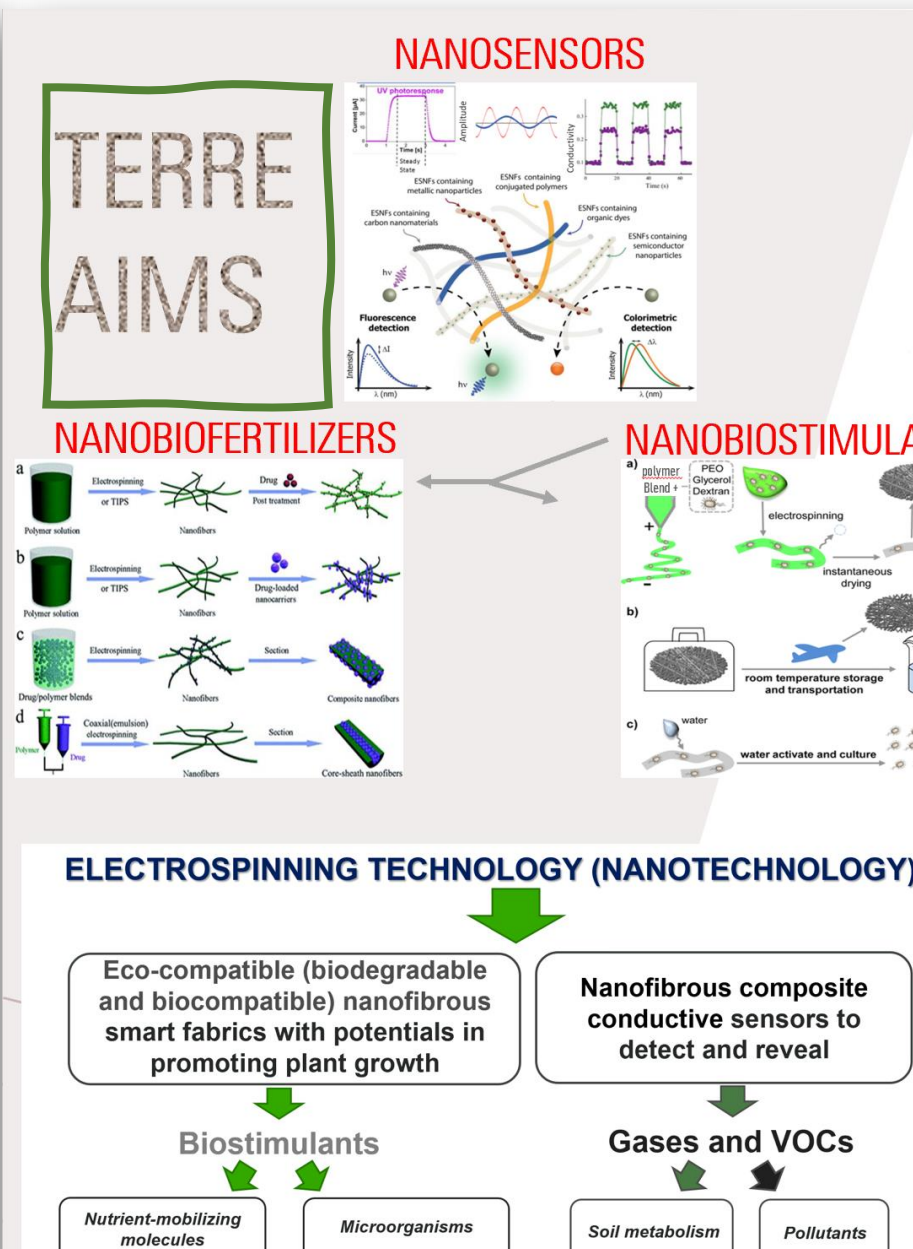
Email: antonella.macagnano@cnr.it; a.macagnano@ia.cnr.it

TERRE AIMS

TERRE proposes innovative strategies to improve the technological infrastructure of agricultural practices, combining the development of new **nano-structured intelligent materials** acting as **biostimulants** of plant growth, with that of new **sensors**, both based on, with the aim of maintaining the competitiveness of crops and farms, while improving the protection of natural resources and preserving the soil ecosystem.

...by a multifunctional bioinspired model implemented with **polymeric electrospinning technology** to obtain versatile and modular nano-fibrous devices in a plethora of architectures (*gauze, fabrics, nets, pots*) and chemical combinations for applications in agricultural systems...

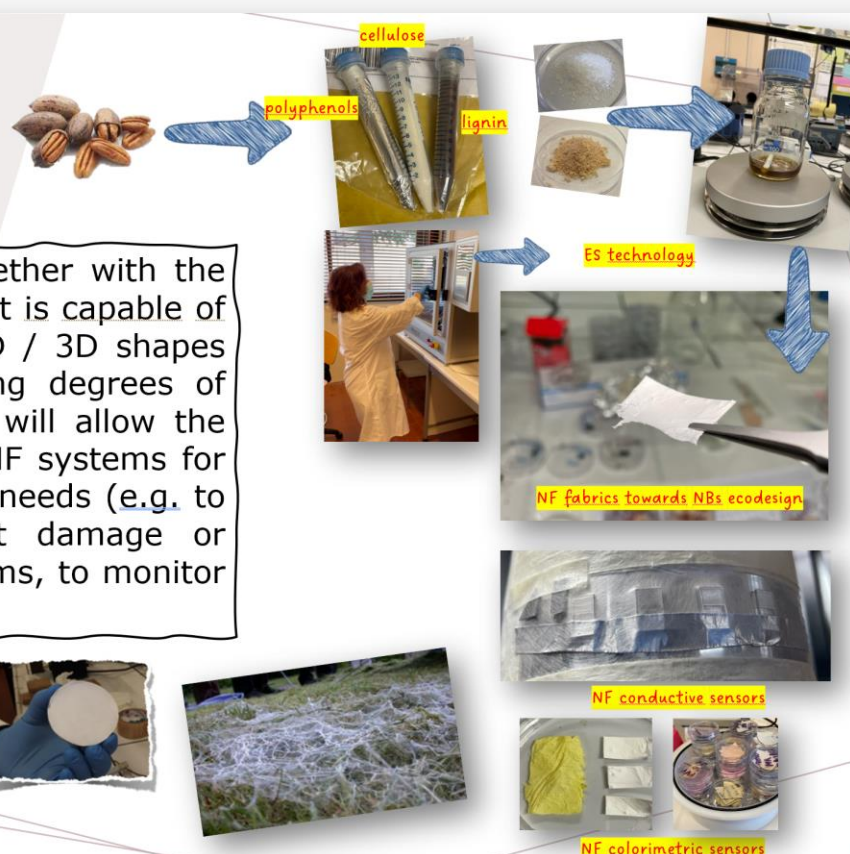
...falling within the mechanisms of a model inspired by **nature** and the principles of **circular economy** (a waste-to-wealth approach, where all products are reused, as in nature, in a circular model of waste valorization)



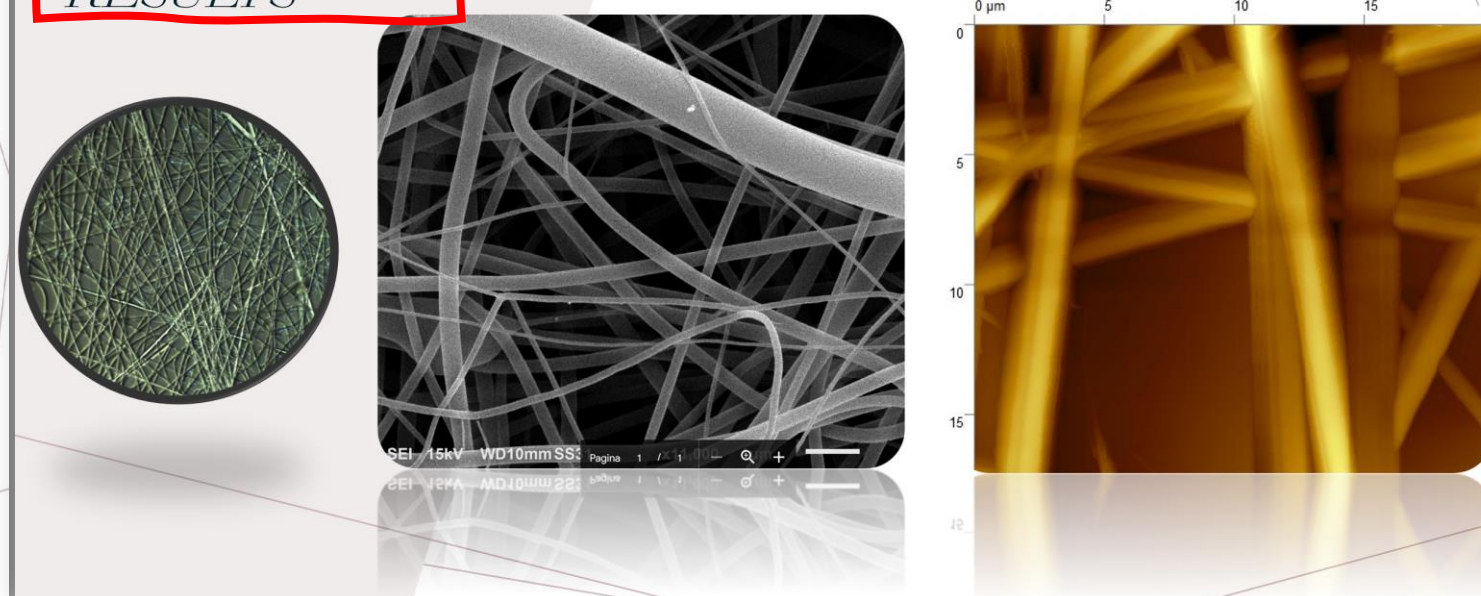
NANOBIOSTIMULANTS/NUTRIENTS NANOSENSORS

TERRE ACTIVITIES: NANOMATERIALS

The use of nanomaterials together with the flexibility of ES technology, that is capable of generating a multiplicity of 2D / 3D shapes and architectures, with varying degrees of porosity and specific surface, will allow the creation of a wide variety of NF systems for various agriculture application needs (e.g. to support nutrition, to combat damage or diseases from harmful organisms, to monitor the healthy status).



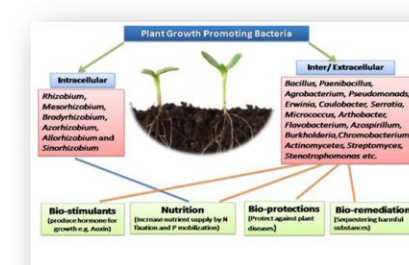
NANOFIBERS LIGNIN BASED: PRELIMINARY RESULTS



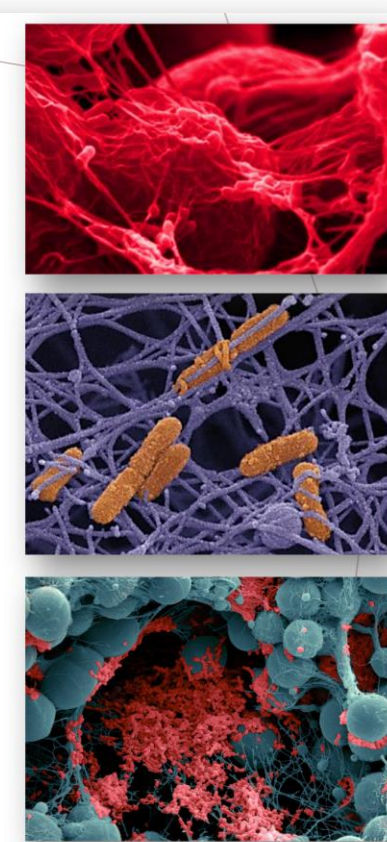
BIOPOLYMER-BASED NANOFIBERS: PRELIMINARY RESULTS FOR HOSTING MICROORGANISMS

the soil ecosystem surrounding the roots where plant, microbes and soil particles mutually interact (advantages or disadvantages) as an "interacting trinity" in:

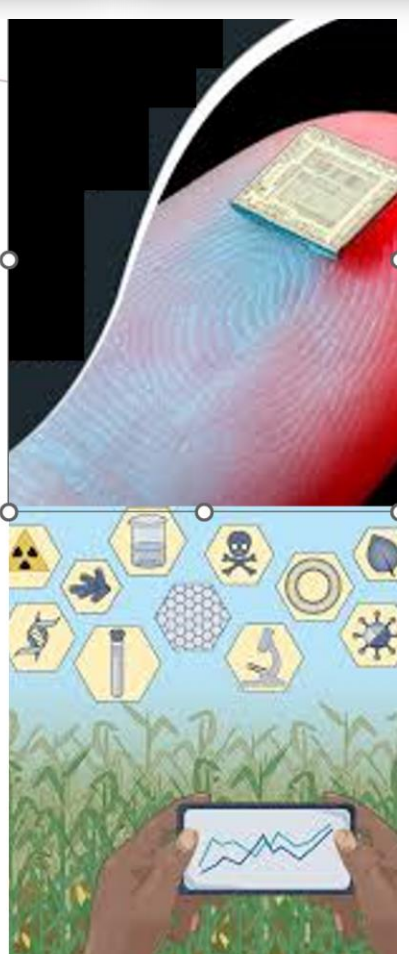
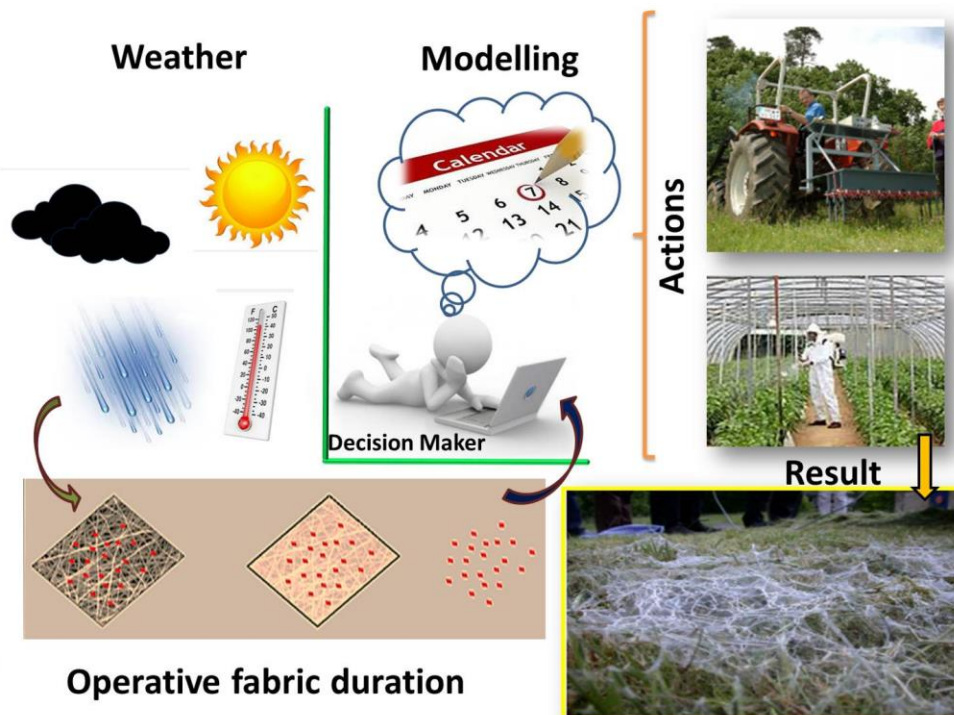
- ☐ nutrition,
- ☐ growth promotion
- ☐ defense.



A strategy model for improving crop yield using beneficial microorganism strains and biodegradable nanofibrous scaffoldings



NANOFIBROUS BIOPOLYMERS TOWARDS MULTIFUNCTIONAL SYSTEMS



You can preserve soil ecosystem through nanomaterials and nanotechnologies contributing to the transformation of actual agricultural systems towards more sustainable and competitive managements

CONCLUSIONS AND PERSPECTIVES

Electrospinning has been confirmed to be an attractive and suitable technology able to fit circular economy strategies, where natural derivatives can be easily redesigned, modulated and properly functionalized towards smart tools for agriculture
Electrospinning technology can be thought as a significant promoter of a new green revolution with reduced farming risks, low costs and smart managing
Economic and environmental impacts: more efficient practices, agrochemicals and products based on natural agents able to reduce the environmental impacts of agricultural systems, but preserve their competitiveness in crop productivity.
Coupling nano(bio)fertilizers and the nanosensors products: an integrated system capable of releasing nutrients in soil and detecting and monitoring the presence of excessive nutrients in soil ecosystems, to reduce further fertilizations and prevent the possible contamination of natural resources.

Environmental Science: Nano, 2019, 2020, COVERS (De Cesare et al.);
Cover Competition Runner up – Materials Today (2016) (De Cesare et al.)

The application of such bioactive products in agriculture (but also in nurseries and gardening) could be powerful in improving crop production and consequently contributing in fulfilling the demand by human populations for healthy and safe foods and environment preservation.