



Project title	A new COLloidal cybernetIc sysTem tOWaRds 2030		
Project acronym	COgITOR		
Project number	964388		
Call	FET Open – Novel ideas for radically new Technologies	Call ID	2020-FETOPEN-2018-2019-2020-01
Topic	FET-Open Challenging Current Thinking	Topic ID	FETOPEN-01-2018-2019-2020
Funding scheme	Research and Innovation Action		
Project start date	01/06/2021	Duration	54 months

SCIENTIFIC PUBLICATIONS LIST, M42

Work package	Wp6
Responsible Author(s)	CTECH, IIT
Contributor(s)	ALL

Dissemination level

Please select only one option according to the GA			
<input checked="" type="checkbox"/>	PU: Public	<input type="checkbox"/>	PP: Restricted to other program participants
<input type="checkbox"/>	RE: Restricted to a group specified by the consortium	<input type="checkbox"/>	CO: Confidential, only for members of the consortium



This project has received funding from the European Union's Horizon 2020 research and innovation programme

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Scientific publications

We provide here an exhaustive list of scientific publications including scientific papers, patents, conference proceedings, as they were implemented/ co-authored by the partners. So far the cumulative impact factor reached by publishing COGITOR activities is 94.7.


Table 6.3.1: scientific papers published, book chapters, proceedings and patents filed.

Scientific Papers	1	Alessandro Chiolerio, Erik Garofalo, Neil Phillips, Ermelinda Falletta, Rodrigo de Oliveira, Andrew Adamatzky Learning in colloidal polyaniline nanorods RESULTS IN PHYSICS 58 (2024) 107501 (I.F. 4.4) https://doi.org/ 10.1016/j.rinp.2024.107501
Scientific Papers	2	M. Crepaldi, C. Mohan, E. Garofalo, A. Adamatzky, K. Szaciłowski, A. Chiolerio Experimental Demonstration of In-Memory Computing in a Ferrofluid System ADVANCED MATERIALS 2211406 (2023) (I.F. 27.4) 10.1002/adma.202211406
Scientific Papers	3	Jamilpanah, L., Chiolerio, A., Crepaldi, M. et al. Proposing magnetoimpedance effect for neuromorphic computing. Sci Rep 13, 8635 (2023). https://doi.org/10.1038/s41598-023-35876-0 (I.F. 3.8)
Scientific Papers	4	Matteo Bevione, Alessandro Chiolerio, Giulia Tagliabue Plasmonic Nanofluids: Enhancing Photothermal Gradients toward Liquid Robots ACS Appl. Mater. Interfaces 2023, 15, 43, 50106–50115, https://doi.org/10.1021/acsami.3c06859 (I.F. 8.5)
Scientific Papers	5	Hygro-Dynamic and Conductive Actuator That Restructures and Heals by Water Qing Chen, Tina Künniger, Qun Song, Kai Zhang, Andrei Chumakov, Yusuf Bulut, Constantin Harder, Peter Müller-Buschbaum, Stephan V. Roth, and Artur Braun Adv. Funct. Mater. 2024, 34, 2402924. https://doi.org/10.1002/adfm.202402924 (I.F. 18.5)
Scientific Papers	6	Restructurable materials for soft actuators (Invited Distinguished Speaker Paper) Qing Chen, Journal of Materials Research 39, 2349–2368 (2024). https://doi.org/10.1557/s43578-024-01423-4 (I.F. 2.7)
Scientific Papers	8	Pavlovian reflex in colloids N Raeisi Kheirabadi, A Chiolerio, A Adamatzky BioNanoScience, 1-9, 2024 (I.F. 3.0)



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Scientific Papers	9	<p>Logical circuits in colloids</p> <p>N Roberts, N Raeisi Kheirabadi, MA Tsompanas, A Chiolerio, M Crepaldi, ...</p> <p>Royal Society Open Science 11 (5), 231939 (I.F. 2.9)</p>
Scientific Papers	10	<p>Complexity and nonlinearity of colloid electrical transducers</p> <p>Raphael Fortulan, Noushin Raeisi Kheirabadi, Alessandro Chiolerio, Andrew Adamatzky</p> <p>arXiv preprint arXiv:2410.19757, 2024</p>
Scientific Papers	11	<p>Achieving liquid processors by colloidal suspensions for reservoir computing</p> <p>R Fortulan, NR Kheirabadi, A Chiolerio, A Adamatzky</p> <p>Communications Materials 5 (1), 199, 2024 (I.F. 7.5)</p>
Scientific Papers	12	<p>Boolean Circuits in Colloidal Mixtures of ZnO and Proteinoids</p> <p>R Fortulan, N Raeisi Kheirabadi, P Mougkogiannis, A Chiolerio, et al</p> <p>ACS omega 9 (41), 42127-42136, 2024 (I.F. 3.7)</p>
Scientific Papers	13	<p>Visible light: shaping chemical intelligence in proteinoid–ZnO interfaces</p> <p>P Mougkogiannis, NR Kheirabadi, A Adamatzky</p> <p>New Journal of Chemistry 48 (40), 17650-17669, 2024 (I.F. 2.7)</p>
Scientific Papers	14	<p>Electrical spiking activity of proteinoids-ZnO colloids</p> <p>P Mougkogiannis, NR Kheirabadi, A Chiolerio, A Adamatzky</p> <p>Neuromorphic Computing and Engineering 4 (1), 014007, 2024 (I.F. 5.8)</p>
Scientific Papers	15	<p>Qing Chen, Roman Furrer, Loghman Jamilpanah, Andrei Chumakov, Yusuf Bulut, Constantin Harder, Peter Müller-Buschbaum, Stephan V. Roth, and Artur Braun</p> <p>Responsive magnetic polymer nanocomposites through thermal-induced structural reorganization, ACS Nano (just accepted), 10.1021/acsnano.4c14311 (IF 15.8)</p>
Book Chapter	1	<p>A. Chiolerio, M. Crepaldi, D. Torraza, N. Raeisi Kheirabadi, and A. Adamatzky,</p> <p>Post Apocalyptic Computing and Technology: Towards Computing from Natural Colloids and Micro-Fragments in WSPC Book Series in Unconventional Computing book series vol. 5, "Post-Apocalyptic Computing", Chapter 7, 2025, Ed. Andrew Adamatzky, World Scientific ISBN 978-981-12-9713-7 (print)</p> <p>https://doi.org/10.1142/13960</p>
Patent	1	<p>Italian patent application (07/11/2022) n. IT 3384158 (Assignee: Fondazione Istituto Italiano di Tecnologia; Inventors: Alessandro CHIOLERIO, Marco CREPALDI) "Sistema e metodo per la memorizzazione delle informazioni".</p>
 Proceedings	1	<p>A. Chiolerio, "Colloid intelligence," Proc. SPIE PC12944, Bioinspiration, Biomimetics, and Bioreplication XIV, PC1294406 (Presented at SPIE Smart Structures + Nondestructive</p> <p>This project has received funding from the European Union's Horizon 2020 research and innovation programme</p>

	Evaluation: March 26, 2024; Published: 17 May 2024); https://doi.org/10.1117/12.3013018 .
Proceedings 2	Implementing Logic Operations in Gold Nanoparticles Colloidal Suspensions R Fortulan, NR Kheirabadi, A Antipov, C Jost, A Chiolerio, A Adamatzky, 13 th International Conference on Modern Circuits and Systems Technologies (MOCAS), Sofia, Bulgaria, 2024, pp. 01-04, doi: 10.1109/MOCAS61810.2024.10615444

Scientific papers in progress, book chapters, proceedings and patents in the pipeline and not yet public / filed.

Scientific Papers in Refeage / Preparation	1	Adriana Nunes dos Santos, Rodrigo José de Oliveira, Alessandro Chiolerio Plasmonic self-healing materials Completed 1 review round, submitted to RSC Nanoscale Horizons (I.F. 8.0)
Scientific Papers in Refeage / Preparation	2	Charanraj Mohan, Marco Crepaldi, Diego Torraza, Andrew Adamatzky, Alessandro Chiolerio Liquid Ferrofluid Synapses for Spike-based Neuromorphic Learning 1 st review round, submitted to RSC Materials Horizons (I.F. 12.2)
Scientific Papers in Refeage / Preparation	3	Charanraj Mohan, Marco Crepaldi, Alessandro Chiolerio An 180 nm Four-Port Multi-Directional ASIC for Holonomic Features Extraction of Colloidal Systems 1 st review round, submitted to IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS I (I.F. 5.2)
Scientific Papers in Refeage / Preparation	4	Alessandro Chiolerio, Giuseppe Vitiello, Mohammad Mahdi Dehshibi, Marco Crepaldi, Andrew Adamatzky Room Temperature Colloidal Entanglement in Ferrofluids 1 st review round, submitted to Physical Review X: Quantum (I.F. 9.3)
Scientific Papers in Refeage / Preparation	5	Alessandro Chiolerio, Marco Pullia, Marco Crepaldi Effects of Ionizing Radiation Bombardment on Ferrofluid Impedance To be submitted to Journal of Physics D: Applied Physics (I.F. 3.1)
Scientific Papers in Refeage / Preparation	6	Qing Chen, et al. Soft actuators with actuating and healing capabilities via layer-by-layer assembly To be submitted



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Scientific Papers in Referege / Preparation	7	Qing Chen, et al. Small angle neutron study on soft matter actuators To be submitted
Scientific Papers in Referege / Preparation	8	Mapping Boolean Logic with Protein-Based Colloids: A Multi-Electrode Array (MEA) Approach Noushin Raeisi Kheirabadi, Raphael Fortulan, Davin Browner, Alessandro Chiolerio, Andrew Adamatzky
Scientific Papers in Referege / Preparation	9	Matteo Bevione, Narmada Gopal, Giulia Tagliabue Hydrogel-Based Thermoelectrochemical Cells for Efficient Waste Heat Recovery Under Passive Cooling Conditions To be submitted
Scientific Papers in Referege / Preparation	10	Artur Braun, Nikolay Ryzhkov, and Alexey Rulev Soft robot for space exploration exposed to cosmic radiation arriving at Sphinx HFSJG Submitted to International Foundation HFSJG / High Altitude Research Stations Jungfrauojoch and Gornegrat Activity Report 2025
Book chapters in Production	1	Alessandro Chiolerio Liquid Spaceships for Advanced Autonomous Exploration Special Issue Book to appear in the Int. Journ. of Unconventional Computing
Record of Invention to be patented (ON HOLD FOR ISSUES)	1	Charanraj Mohan, Marco Crepaldi, Alessandro Chiolerio Multi-Directional ASIC for Holonomic Features Extraction
Record of Invention to be patented	2	Adriana Nunes dos Santos, Alessandro Chiolerio Room Temperature Self-Healing Material



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Scientific talks delivered by COGITOR.

Invited Talks	1	<p>Professor A. Chiolerio</p> <p>Title Intelligence: Attempting to Build a Bridge Between Artificial and Biological Domains</p> <p>3rd International Conference on Functional Materials & Chemical Engineering</p> <p>Dubai, EAU</p> <p>Date 10th November 2022</p>
Invited Talks	2	<p>Professor A. Chiolerio</p> <p>Title Intelligence: advancements across Artificial and Biological domains</p> <p>Hasard 4, Xocholat</p> <p>Fri-son, Fribourg, CH</p> <p>Date 8th March 2023</p>
Invited Talks	3	<p>Professor A. Chiolerio</p> <p>Title Liquid intelligence: advancements across the synthetic domain</p> <p>2nd International Conference on Physics and its Applications</p> <p>Los Angeles, USA</p> <p>Date 18th July 2023</p>
Invited Talks	4	<p>Professor A. Chiolerio</p> <p>Title Advances in colloid computers</p> <p>Workshop of Unconventional Computing</p> <p>V-Shed, Bristol, UK</p> <p>Date 5th October 2023</p>
Invited Talks	5	<p>Professor A. Chiolerio</p> <p>Title Colloid Intelligence</p> <p>ISN2A 2024 – VIth International Caparica Symposium on Nanoparticles / Nanomaterials and Applications</p> <p>Costa do Caparica, Portugal</p> <p>Date 23rd January 2024</p>
Invited Talks	6	<p>Professor A. Chiolerio</p> <p>Title Colloid Intelligence</p> <p>SPIE – Smart Structures + Nondestructive Evaluation</p>




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		<p>Bioinspiration, biomimetics, and bioreplication XIV</p> <p>Hilton Hotel, Long Beach, USA</p> <p>Date 26th March 2024</p>
Invited Talks	7	<p>Professor A. Chiolerio</p> <p>Title Autonomous Liquid Systems for Space Exploration</p> <p>Gagarin Readings</p> <p>Arnolfini, Bristol, UK</p> <p>Date 11th April 2024</p>
Invited Talks	8	<p>Professor A. Chiolerio</p> <p>Title Colloid intelligence</p> <p>IMEM – CNR (seminar)</p> <p>Parma, Italy</p> <p>Date 11th July 2024</p>
Invited Talks	9	<p>Professor A. Chiolerio</p> <p>Title Colloid intelligence</p> <p>IC – ANMBES 2024</p> <p>Brasov, Romania</p> <p>Date 18th September 2024</p>
Invited Talks	10	<p>Professor A. Chiolerio</p> <p>Title Liquid computing</p> <p>Alternative Computing Architectures</p> <p>Bonn, Germany</p> <p>Date 16th October 2024</p>
Invited Talks	11	<p>Professor A. Chiolerio</p> <p>Title Holonomic computing: early architecture and new developments</p> <p>COgITOR Readings</p> <p>Nizza Monferrato (AT), IT</p> <p>Date 31st October 2024</p>



		Date 23 rd April 2024
Contributed Talks	1	<p>Researcher A. Nunes dos Santos</p> <p>Title Self-healing Materials</p> <p>ISN2A 2024 – Vith International Caparica Symposium on Nanoparticles / Nanomaterials and Applications</p> <p>Costa de Caparica, Portugal</p> <p>Date 23rd January 2024</p>
Contributed Talks	2	<p>Researcher M. Bevione</p> <p>Title Photo-Thermo-Electrochemical Cell for Energy Harvesting</p> <p>MNHMT 2024, 7th ASME International Conference of Micro/Nanoscale Heat and Mass Transfer</p> <p>University of Nottingham, UK</p> <p>Date 7th August 2024</p>
Contributed Talks	3	<p>Researcher Qing Chen</p> <p>Multi-sensing and self-healing skin for robotic applications</p> <p>American Chemical Society, Fall meeting 2023, August 2023</p> <p>San Francisco, U.S.A.</p> <p>Date 17th August 2023</p>
Contributed Talks	4	<p>Researcher Qing Chen</p> <p>Investigation of strain-induced deformation of polymer thin films with small-angle X-ray scattering (SAXS) as a tool for microstructural study</p> <p>COLLOQUIUM636 "MODULATION OF PHYSICO-CHEMICAL PROCESSES BY ELASTIC STRAIN ENGINEERING"</p> <p>Besançon, France</p> <p>Date 22nd May 2023</p>
Contributed Talks	5	<p>Professor Alessandro Chiolerio</p> <p>Liquid intelligence: advancements across the synthetic domain,</p> <p>The Science of Consciousness TSC-2023</p> <p>Taormina (ME) Italy</p> <p>Date 23rd May 2023</p>
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Divulgation Papers / Newspapers	<p>1 Alessandro Chiolerio</p> <p>Liquid computing and cybernetics for robotics and computer science</p> <p>Open Access Government 185909 (2024)</p> <p>https://www.openaccessgovernment.org/article/liquid-computing-and-cybernetics-for-robotics-and-computer-science/185909/</p>
Divulgation Papers / Newspapers	<p>2 Federica D'Auria</p> <p>Costruire un computer liquido</p> <p>Wired Italia, 29/12/2023</p> <p>https://www.wired.it/article/computer-liquido-istituto-italiano-di-tecnologia/</p>
Divulgation Papers / Newspapers	<p>3 Barbara Marcotulli</p> <p>L'Italia all'avanguardia: dell'IIT di Genova arriva il calcolatore a base liquida</p> <p>Maker Faire Rome, 06/02/2024</p> <p>https://makerfairerome.eu/it/litalia-allavanguardia-dallit-di-genova-arriva-il-calcolatore-liquido/</p>
Divulgation Papers / Newspapers	<p>4 Francesco Rosso</p> <p>COGITOR: la rivoluzione della robotica morbida svelata a Nizza Monferrato</p> <p>Il Nazionale, 30/10/2024</p> <p>https://www.ilnazionale.it/2024/10/30/leggi-notizia/argomenti/eventi-e-turismo/articolo/cogitor-la-rivoluzione-della-robotica-morbida-svelata-a-nizza-monferrato-1.html</p>
Divulgation Papers / Newspapers	<p>5 Nemanja Babic</p> <p>Lo studio dei liquidi e la cibernetica - Conferenza del ricercatore Chiolerio</p> <p>La Nuova Provincia, 05/11/2024</p> <p>in print</p>

