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RELAZIONE ATTIVITA' ANNUALE DEI PERFEZIONANDI/DOTTORANDI – TERZO/QUARTO ANNO
REPORT ON THE PHD ACTIVITY – THIRD/FOURTH YEAR

NOME E COGNOME NAME AND SURNAME	Ana Katrina Mapanao
DISCIPLINA PHD COURSE	Nanosciences

CORSI FREQUENTATI CON SOSTENIMENTO DI ESAME FINALE ATTENDED COURSES (WITH FINAL EXAM)	VOTAZIONE RIPORTATA MARK	NUMERO DI ORE HOURS
-none-		

CORSI FREQUENTATI SENZA SOSTENIMENTO DI ESAME FINALE ATTENDED COURSES (ATTENDANCE ONLY)	NUMERO DI ORE HOURS
-none-	

ALTRE ATTIVITÀ FORMATIVE (SEMINARI, WORKSHOP, SCUOLE ESTIVE, ECC.) – DESCRIZIONE OTHER PHD ORIENTED ACTIVITIES (SEMINARS, WORKSHOPS, SUMMER SCHOOLS, ETC) – DESCRIPTION	NUMERO DI ORE HOURS
6th International conference on Multifunctional, Hybrid and Nanomaterials (11-15 March 2019; Sitges Spain)	40

ATTIVITÀ DI RICERCA SVOLTA (MAX. 8.000 CARATTERI)* RESEARCH ACTIVITY (MAX. 8000 CHARACTERS)
<p>In the previous academic year, I evaluated the effects of nanoparticle surface functionalization on cell targeting and internalization using three-dimensional (3D) cell cultures. Continuing on this subject theme, my main research activities currently focus on the assessment of the cancer theranostic applications of gold-based nano-architectures (NAs) on 3D cell models.</p> <p>The photothermal and chemotherapeutic effects of the different types of NAs (tNAs, and NAs-cisPt, respectively) have been demonstrated by our group using several cell lines grown both in 2D and 3D. As for my research, I modified the established synthesis protocols to prepare a type of</p>



NAs that is capable of combined chemo and photothermal therapies (tNAs-cisPt). After synthesis standardization and nanoparticle characterization, I now assess and compare the therapeutic effects of tNAs and tNAs-cisPt on 3D head and neck squamous cell carcinomas (HNSCC).

The two HNSCC cell lines, in which one is HPV-positive, had different chemotherapeutic response after incubation with NAs-cisPt. Additionally, significant decrease in cell viability was observed after 48 hours, in agreement with the findings on the biodegradation of NAs. Meanwhile, the hyperthermia effects of tNAs on HPV-negative HNSCC caused less cell killing effect within the 72h time point, compared to chemotherapy. Several settings with variations in irradiance, length of irradiation time, and repeated stimulation have been performed. Double irradiation of 20 minutes each at 150 mW/cm² induced the higher cell killing effect among the different settings, using tNAs. This set-up will now be used to evaluate the therapeutic effects of tNAs-cisPt. Finally, the optimal treatment setting will also be applied on HPV-positive HNSCC.

Future possible projects will still be in line with the preparation of multifunctional nanoparticles and their assessment on 3D cancer models. These include the preparation of NAs for combined photoacoustic/ultrasound imaging and photothermal therapy. Lastly, different types of NAs are also set to be employed on a more complex biological system comprised by tumor cells/spheroids deposited on chicken eggs, for chorioallantoic membrane (CAM) assay. This research line will give information on the effects of the different NAs on blood vessels formation (angiogenesis), which is another important factor in cancer management.

I also participated in other collaborative studies, mostly involving the NAs:

- Synthesized nanoparticles with modified features (loaded with dye or chemotherapeutic prodrug) for collaborators in The Netherlands and Finland
- Synthesized and quantified nanoparticles for biodegradation and biokinetics studies, in partnership with IIT-Genova and CNR-Pisa

EVENTUALI PUBBLICAZIONI

PUBLICATIONS (IF AVAILABLE)

Cassano, D., Summa, M., Pocoví-Martínez, S., Mapanao, A., Catelani, T., Bertorelli, R. and Voliani, V. (2018). Biodegradable Ultrasmall-in-Nano Gold Architectures: Mid-Period In Vivo Distribution and Excretion Assessment. *Particle & Particle Systems Characterization*, 36(2), p.1800464.

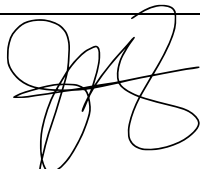
Cassano, D., Santi, M., D'Autilia, F., Mapanao, A., Luin, S. and Voliani, V. (2019). Photothermal effect by NIR-responsive excretable ultrasmall-in-nano architectures. *Materials Horizons*, 6(3), pp.531-537.

Cassano, D., Mapanao, A. K., Summa, M., Vlamidis, Y., Giannone, G., Santi, M., Guzzolino, E., Pitto, L., Poliseno, L., Bertorelli, R., Voliani, V. (2019) Biosafety and Biokinetics of Noble Metals: The Impact of Their Chemical Nature. *ACS Appl. Biomater.* <https://doi.org/10.1021/acsabm.9b00630>.



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NOME DEL RELATORE THESIS ADVISOR
Valerio Voliani (IIT) Stefano Luin (internal SNS)

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04/10/19	



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Sixth International Conference on

Multifunctional, Hybrid and Nanomaterials

11–15 March 2019, Sitges, Spain



Certificate of Presentation

We hereby confirm that

Ana Katrina Mapanao

Presented

Avoiding noble metal persistence: The ultrasmall-in-nano approach

**At the 6th International Conference on Multifunctional, Hybrid
and Nanomaterials**

11-15 March 2019, Sitges, Spain

C. Mamberti

**Cinzia Mamberti
For and on behalf of Elsevier Ltd**

