

Dott.ssa Alessia Colombo

Alessia Colombo was born in Rho (MI) on July 20th, 1979.

She graduated in Chemistry (2003, 110/110) under the guidance of Prof. E. Santaniello with a thesis on synthesis of modified adenosines. After graduation she worked in Prof. B. Danieli's laboratories (2004-2005). Ph.D. in Industrial Chemistry under the guidance of Prof. G. Lesma (Dept. of Organic Industrial Chemistry, 2008). Since 2008 she collaborates with Prof. D. Roberto and Prof. R. Ugo (Dept. of Chemistry, University of Milan) first as INSTM fellow and then as fellow of the University of Milan. In October 2016 she became researcher (RTD-A) in CHIM03

Her research interests are in the following areas:

(1) *Synthesis and characterization of ruthenium complexes for application in Bulk-Heterojunction Solar Cells (BHJ)*. She studied the use of Ru-acetylides as a novel interesting tool for the design of donor materials to combine with electron-withdrawing fullerides in bulk heterojunction solar cells. In particular, she prepared a new dinuclear Ru(II) complex where two Ru atoms are separated by a bridge consisting of a 2,1,3-benzothiadiazole acceptor moiety flanked on either side by 2,5-thienyl donor units. This rather simple complex appears to behave as a photoactive donor when blended with a fullerene as acceptor, thus being a first step toward novel bulk heterojunction solar cells, based on Ru donor systems.

(2) *Synthesis and characterization of coordination compounds for application in Dye Sensitized Solar cells (DSSCs)*. In the field of DSSCs she prepared new thiocyanate-free cyclometalated Ru(II) with donor thiophene-based substituents on the pyridine ring of the cyclometalated ligand, showing how such substitution with donors leads to enhanced optical properties and DSSC power conversion efficiencies. These results were object of three Patents (*Pct.* WO2012013719A120120202, MI2010A001400 and MI2013A000149). She also prepared thiocyanate-free pyridyl-tetrazolate Ru(II) sensitizers, the first examples of a new promising class of dyes.

In the last few years, she focused her research on the development of Cu(I) complexes with π -delocalized ligands to get sensitizers with no noble metals and therefore cheaper, while retaining a high enough efficiency. In parallel she prepared new non corrosive Cu(I)/(II) complexes with tetragonal distorted geometry and with soft ligands, capable of minimizing the structural change that occurs during the transition between Cu(II) and Cu (I) in order to replace the I_3^-/Γ pair commonly used as electrolyte in DSSC. From the union of these two aspects, very recently, she reported for the first time a “full” copper based DSSC solar cell where photosensitizer and redox mediator are both copper complexes.

(3) *Synthesis and photophysical characterization of organic and coordination compounds with luminescent or nonlinear optical (NLO) properties*. Her studies allowed the understanding of the electronic factors that tune the increase of the NLO response in metallic complexes with π -delocalized nitrogen donor ligands. She has also developed a knowhow in the nano-organization of the NLO-active chromophores in polymeric matrices to afford NLO-active composite films. Recently she reported the first example of photo-modulation of the NLO response of a photochromic metal complex in thin polymer films, opening a new avenue for the preparation of

reversible-NLO switches. Besides, she showed the possibility to use novel Pt(II) complexes for solution-processable White organic light-emitting diodes (WOLEDs) and that, by favouring Pt-Pt interactions, materials can be obtained that emit deep into the Near infrared (NIR), and from which NIR OLEDs can be fabricated. In this field she participated to COST D35 (2006-2011), a European network that linked researchers from UK, France, Italy, Germany and Czech Republic on the Project “Multifunctional organometallic chromophores for light-emitting devices and luminescent sensors”. Recently she focused her attention on the synthesis and characterization of novel luminescent cyclometallated Pt(II) complexes with potential anticancer activity related to their ability to form $^1\text{O}_2$. These promising anticancer systems are easily localized in the tissues thanks to their high luminescence.

She also synthesized fluorescent organic dyes to prepare multifunctional thin film coating for application in solar concentrator or as luminescent downshifting layer.

A. Colombo is author of 3 Patent, **64** publications on international journals (14 as corresponding author), she has an H index of 21 and more than 1150 citations and she presented 50 communications at national and international congresses.

Bibliometric data (from Scopus)

documents: **64** Total citations **1151**; H index: **21**;

Corresponding author of **14 papers**

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