

Prof. Edit Tshuva completed her Ph.D. studies with distinction at Tel Aviv University in 2001, under the supervision of Prof. Moshe Kol. She received several awards, including the Wolf Award, the Schmidt Award and others, for her thesis on the development of organometallic catalysts for the polymerization of olefins. In 2003, after completing post-doctoral studies at the Massachusetts Institute of Technology (MIT), she became a senior lecturer at The Hebrew University of Jerusalem as an Alon Scholar, and in 2009 she was promoted to the rank of Associate Professor. In that year she was awarded a European Research Council (ERC) Young Investigator Grant. Her research focuses on bioinorganic chemistry, a field that lies on the interface between inorganic and coordination chemistry and life sciences.

Prof. Tshuva designs and develops synthetic inorganic molecules with biological and medicinal applications. Her research group (with previous support from the Human Frontier of Science program) develops peptide models for copper-binding proteins in biological systems. Initial findings from this research were published in 2011 in *Chemical Communications*, followed by a full paper in *Inorganic Chemistry* in 2013. Copper is an essential metal for the proper functioning of cells, but an excess of copper may become toxic and cause disease. Thus, copper-metallochaperone proteins in biological systems are responsible for the controlled delivery of copper to various parts of the cell. Using peptide models of these proteins, Prof. Tshuva and members of her group investigate the copper coordination and its dependence upon various conditions, in order to shed light on the way nature copes with copper's potential toxicity. For example, it was found that pH has a tremendous impact on the metal binding mode, giving rise to the theory that varying pH conditions in different biological environments contribute to the metal binding and its release in specific locations. Understanding the mechanism of metal delivery is of critical importance, as this could lead to the development of medicinal systems designed to remove excess copper from the biological environment.

In other research (supported primarily by the ERC, the Israel Science Foundation, the Lower Saxony Ministry of Science and the Israel Cancer Research Fund), Prof. Tshuva's group develops titanium-based compounds with anticancer properties. Their first study was published in the *Journal of the American Chemical Society* (2007), demonstrating for the first time titanium-based systems with salan ligands that feature high stability toward hydrolysis and high anti-tumor activity. The metalbased anti-cancer chemotherapy in clinical use today is based on platinum compounds that have serious side effects. Past studies have shown that titanium compounds, which are more biologically-friendly, have fewer side effects while remaining highly active and effective against platinum-resistant cells. The main problem has been the low stability of the titanium compounds in aqueous environments and their rapid dissociation to undefined aggregates. This behavior has made it difficult to study the mechanism of the biological activity and to characterize the nature of the active species.

In a series of articles, Prof. Tshuva's research group described the high stability and defined hydrolysis of titanium-salan compounds and the impact of several structural aspects on the behavior of these complexes. Their properties enabled to monitor and investigate the mechanism of their reactivity in aqueous environment. This has led to the unexpected discovery that the hydrolysis products feature anti-cancer properties, and that it is possible to develop titanium-based compounds combining high and broad-spectrum anti-cancer activity with resistance toward hydrolysis. The publication of this finding in the journal *Angewandte Chemie Int. Ed*, chosen for the issue's back cover photo, was selected as a "hot paper." Additional mechanistic studies are currently underway, with the collaboration of Prof. J. Hochman (life sciences, Hebrew University) and Prof. S. Magdassi (applied chemistry, Hebrew University).