

Pesticides in the mirror

New devices able to recognize the actual pollution potential of substances



How to assess, and then to be able to counteract, the actual environmental impact of emerging pollutants, such as various pesticides? It can be done starting from one of their specific features: chirality, namely the mirror image of the same molecule, which presents itself in two different forms, simply owing to the spatial position of the groups that compose it. To understand this diversity, just think of our feet and a shoe: feet are the specular image of each other, but we can appreciate their difference when we try to wear a shoe, for instance the right. Only the right foot will fit the shoe, but not so the left. Nature has precisely this characteristic, so that specular forms of the same molecule can have completely different, often dramatic effects, when absorbed by an organism. Developing chemical sensors able to allow rapid detection of pesticide chirality and therefore their actual environmental impact is the aim of an Italian-led H2020 project, called "Initio": the European consortium counts on the participation of the Department of Chemical Sciences and Technologies of the University of Roma "Tor Vergata" (the leading partner), and Eurochem Italia srl (one of the two small and medium-sized enterprises that make up the work group, together with four other universities). "This is a multidisciplinary project, in which chemists, material science experts and engineers collaborate - Professor Roberto Paolesse of Tor Vergata, coordinator of the Initio project, explains - and, indeed, also two small and medium-sized enter-



THE INITIO PROJECT TEAM

prises that will have the task of trying the field validation of the characteristics of such devices and to cooperate in the development of demonstration tools for these systems." The work plan is limited to an operational proposal, "but if we can already develop the device at an industrial level, then so be it..." The research bases its foundation on the fact that many emerging pollutants, such as several pesticides, are chiral, but their use and even their control does not take this feature into account. Even the non-active form is dispersed in the environment and its effects are hardly predictable, and they might lead to important consequences. The separation, however, is difficult, also because the distinction is not immediate. "When these substances are diffused in the environment, both forms are spread, but the half that does not work might also be really deleterious - Paolesse contin-

ues - so, the mission we set ourselves is to be able to distinguish their presence. The greatest challenge is the implementation of solid-state receptors able to carry out this discrimination, reacting differently with the two forms of the same molecule." The first phase of the project, started at the beginning of 2019, will be based precisely on the construction of the receptors; in the next phase, these tools will have to be transferred to a solid phase to concretely build the instrument that can then be deployed. For the staff of the Department of Tor Vergata, beside the task of coordination, there are several other planned activities: "The group I work with already has enough experience with chemical sensors - the professor concludes - for this reason, within the project, it is up to us to join forces for both the development of receptors and the implementation of chemical sensors." ■