

SCIENTIFIC TALKS

Dr. Dimitri Roditchev

“Superconductivity reveals its secrets”

Discovered 110 years ago, superconductivity is the most famous macroscopic quantum phenomenon. The works on superconductivity were awarded by 13 Nobel Prizes. The phenomenon is widely used in accelerators for radiotherapy, magnetic resonance imaging systems, trains, electrical power transmission lines, single photon detectors, qubits and many other devices. This many-body coherent phenomenon is extremely complex; it took more than 40 years of huge theoretical efforts worldwide to be understood, yet very approximately. Even now, our knowledge about the origin of superconductivity in many superconducting materials remains limited. For instance, the superconductivity of the so-called high-T_c superconducting cuprates or superconducting pnictides is not explained and still waits for its Nobels. In this talk, a brief presentation of the phenomenon of superconductivity and its main manifestations will be done. Recent topic and challenges will be presented. At the last part of the talk, the research on local properties of superconductors currently conducted in LPEM-ESPCI on atomic scale with an Scanning Tunneling Microscopy/Spectroscopy will be overviewed.

Prof. Etienne Barthel

"The mystery of the telephone cord"

Compressively stressed thin films with low adhesion frequently buckle and delaminate simultaneously into telephone cords. Although these buckles have been studied for decades, no complete understanding of their propagation has so far been presented. In this study, we have coupled a nonlinear plate deformation with a cohesive zone model to simulate the kinematics of a propagating telephone cord buckle in very close agreement with experimental observations. Proper inclusion of the dependence of an adhesion upon the mode mixity proved to be central to the success of the approach. The clarification of the mechanism promises better understanding of buckle morphologies.

Dr. Mélanie Douziech

Life Cycle Assessment – Why, what, how, and under which circumstances?

The current environmental challenges faced by our society call for decisions and actions to reduce the impacts of our activities. In order to be useful and to avoid any potential burden shifting, these decisions and actions need to rely on robust estimates of each alternative's environmental impacts. The Life Cycle Assessment (LCA) methodology allows such quantification. LCA is a normalized, multi-criteria tool for the systematic evaluation of all environmental impacts of a product or system throughout its entire life cycle. This talk will provide answers to four questions around LCA: First of all, why LCA is so important and should be used. Second, what is LCA exactly? Third, using the production of polyethylene terephthalate as illustration, the LCA methodology's working principles will be depicted. Finally, the circumstances under which LCA can be applied will be investigated. Hereby, the uncertainty and variability of LCA results and the implications of methodological choices on these results will be discussed.