

Research profile of Giovanni Maizza

The main research activity of G.M. concerns the development of integral multiphysics/multiscale and experimental/numerical methodologies to simultaneously optimize new production processes and predict the final properties of materials with the minimum contribution of experimental tests. He has carried out research on metal and ceramic powder injection molding, super-fast sintering of metal and ceramic nanopowders, DC plasma chemical vapor deposition of diamond thin films under high gravity (centrifugal) conditions, self-propagating combustion synthesis (SHS) of hard coatings, ultra-fast welding of similar and dissimilar alloys, various sintering processes (spark plasma sintering, capacitance discharge and milliwave) of metallic-ceramic nanocomposites, radio frequency heating of dielectric materials, electromagnetic induction surface hardening of steels and cast iron, additive manufacturing by EBM and laser of metallic alloys and repair of steel molds by wire laser deposition. He has established long-term research collaborations with numerous Japanese laboratories (NIMS, AIST), universities and private companies, and has also participated in several European consortia within EU-funded research projects. He has developed specific skills on diagnostics of the d.c. plasma with optical spectroscopy in high and low gravity conditions, coating of ceramics with supersonic cold spray and capacitive discharge, synthesis of metal nanoparticles by capacitive discharge wire explosion, synthesis of innovative materials during low gravity condition (parabolic flights and drop tower). Most of the researches developed on materials and processes are destined to the sector of cutting tools, manufacturing moulds, high-performance mechanical components for constructions, automotive and aerospace applications. He has developed custom self-consistent multiphysics / multiscale simulation (Fortran, Matlab, C++, etc.) codes for industry and international researches based both on finite element coupled with discrete numerical techniques (e.g. molecular dynamics, Monte Carlo, particle in cell, DSMC, neural and fractal networks) and via the development of models within commercial codes (e.g. Ansys, Sysweld, Comsol Multiphysics, Phoenix, Ace+, Magnasoft, LS-Dyna, FLEXPDE, Welding ESI, Flux2D/3D, etc.). He has been organizer or chairman or rapporteur of scientific symposia within the international Federation of Aeronautics and Astronautics (IAF, Paris), the Euromat International Conference and other international conferences in the field of processes and novel metallic materials. For a decade he served as the Italian coordinator of the Italy-Japan Network of Excellence on nanomaterials, processes and nanodevices under the umbrella of the EU Research General Directorate and the support of the Italian Ministry of Foreign Affairs and the Embassy of Italy in Tokyo.