Italian Society of Mineralogy and Petrology

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SIMP PRIZES IN 2012

Panichi Prize (for Mineralogy)

Maria Lacalamita graduated cum laude in 2005 in natural sciences at the University of Bari. She earned a PhD in Earth sciences at the same university in 2009, defending the thesis "Chemical and structural study of anionic and cationic sites in trioctahedral micas at room and high temperatures." From 2009 to the present, she has been a research fellow at the University of Bari. Her research focuses on natural multilayer nanostructured materials, specifically nonexpandible phyllosilicates. She has made significant contributions to the characterization of the crystal chemistry of Ti-phlogopite in different geologic contexts, with particular emphasis on the analysis of the structural effects of Ti–Fe^{3+} oxy substitution, the role of these effects in the thermal behavior of phlogopite, and the kinetics of the Fe-oxidation/deprotonation process. Some of her other achievements are related to the employment of a multianalytical approach to the study of local ordering and oxidation states in phlogopite and in particular to the use of advanced methods of spectroscopic characterization (such as micro-FTIR and micro-XANES) and to the study of phlogopite of rare composition and rare mica polytypes. Maria Lacalamita is an author or coauthor of 11 articles in international journals and 24 abstracts and proceedings related to national and international congresses.

SIMP Prizes in 2012 for PhD Students

Matteo Ardit: *Lattice relaxation in solid solutions: Long-range versus short-range structure around Cr^{3+} and Co^{2+} in oxides and silicates*

Perovskite, alumoniobite, and melilite solid solutions were obtained by doping octahedral and tetrahedral sites with transition metal ions (e.g. Cr^{3+}, Co^{2+}, and Zn^{2+}) through solid-state synthesis. The "averaged" crystal structure (long-range properties) and the local structure around the substituting ions (short-range properties) were determined with X-ray powder diffraction (XRPD) and electronic absorption spectroscopy (EAS), respectively. Since the precise determination of a structure around impurities is fundamental to the provision of detailed information on the physical properties of such compounds, the behavior of some compounds was also studied under high temperature and pressure. The structural relaxation coefficient for each studied solid solution was calculated by combining the mean with the local bond distances determined by XRPD and EAS, respectively.

Matteo Masotta: *Magma differentiation in shallow, thermally zoned magma chambers: The example of Sabatini Volcanic District (central Italy)*

Large explosive eruptions are commonly fed by shallow, thermally zoned magma chambers and usually produce texturally and chemically zoned deposits (crystal-poor versus crystal-rich products). The formation of solidification fronts at the cooling boundaries of these shallow magma chambers primarily controls magma differentiation and crystal–melt separation. Piston-cylinder experiments were performed in the presence of a temperature gradient, reproducing the environmental conditions of a solidification front. The experimental products indicated that both crystal-rich and crystal-poor textures coexisted within the experimental solidification front and that the upward extraction of differentiated interstitial melt may result in the formation of a compositionally and texturally stratified reservoir. Volcanic rocks from the Sabatini Volcanic District (central Italy) provide textural evidence that the extraction of interstitial melt from unstable solidification fronts is likely to occur in shallow, thermally zoned magma chambers.

Vincenzo Stagno: *The carbon speciation in the Earth's interior as a function of pressure, temperature and oxygen fugacity*

Experiments were performed using a multianvil apparatus at the Bayerisches Geoinstitut (Germany) and the Geodynamics Research Center (Japan) to investigate the stability of elemental carbon (diamond or graphite) and oxidized carbonate of CO_2-bearing species (carbonatitic or kimberlitic melts) at pressures, temperatures, and redox conditions representative of Earth's interior. Research also focused on the calibration of new Fe^{3+}-sensitive oxy-thermobarometers for application to natural eclogite and peridotite assemblages. Results from this study have improved our understanding regarding the residence time of carbon in the mantle, the extent of the deep carbon cycle, and the oxidation of iron-bearing mantle silicates during carbon/carbonate redox reactions. Because of the strong ties with the Deep Carbon Observatory, results from this study were featured in a DCO science highlight, "Magnesite as a Deep Carbon Reservoir." This research was supported by the EU Marie Curie Project "Atomic to Global" and the German Research Foundation (DFG).

Azzurra Zucchini: *Dolomite stability as a function of P, T, pCO_2 and cation ordering. Applications to natural processes*

A detailed study of the order–disorder–reorder process in the dolomite structure has been carried out coupling experimental (ex situ XRPD and SC-XRD) and theoretical (ab initio calculations) approaches. The influence of cation dis(re)order in the dolomite structure was then investigated considering both compressibility (through HP-SC-XRD experiments at a synchrotron source coupled with ab initio calculations) and solubility (via a set of dissolution experiments in aqueous solutions at different T and pCO_2). The results showed evidence of twinning domains in thermally treated samples, which implies reordering processes during the quench, and twin domains were proposed as a witness to thermally induced intralayer-type cation disordering. Dis(re)ordering was found to increase both the compressibility and the solubility of dolomite.

A NEW SIMP PRIZE DEDICATED TO THE MEMORY OF ENZO MICHELE PICCIRILLO

Enzo Michele Piccirillo

Thanks to a generous donation made by SIMP member Rosangela Bocchio, a longtime friend and colleague of Enzo M. Piccirillo, a new prize was awarded in 2012 in his memory. The Piccirillo Prize consists of a postdoctoral grant to a young researcher in petrology. Enzo M. Piccirillo, who died on January 9, 2012, at the age of 69, was a professor of petrology at the University of Trieste and was deeply involved in a number of national and international research projects, for example, the study of volcanism in the Paraná Basin.

This first edition of the prize was awarded to **Ciro Cucciniello** (University "Federico II", Napoli). He will spend six months at Curtin University in Perth (Australia), where he will continue his current research project on the Igneous Province of Madagascar by means of high-precision Ar–Ar radiometric dating.