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Resolving the origin of the floating 2011 El Hierro volcanic products: A Raman approach

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The early stage of the submarine eruption at the flank of El Hierro, that started on 10th of October 2011, was characterised by peculiar floating stones on the ocean surface. The stones, named "restingolites" after a nearby village, consist of pumiceous (glassy) rounded light-coloured material in the core, mantled by a dark basanite crust. The color of the core material varies from white to dark-grey; in parts a schlieren-like texture is observed. The origin of these light-colored cores is widely discussed. Troll et al. (2011) favour a sedimentary origin, while other authors (Coello, 2011; Gimeno 2011) suggest a magmatic one, due to the textural similarity between the restingolites and magmatic derived pumice. A magmatic origin of the light-coloured glasses would suggest a highly evolved magma underlying the island and, in this case, sustained explosive eruptions would be a real possibility.

To provide additional evidence in order to make such a distinction, we analysed the glass structure of natural volcanic pumice glasses of evolved composition (e.g. Krakatau), the floating stones of El Hierro, and experimentally fused glasses from natural sedimentary rocks. The analyses have been obtained at the Raman Laboratory at Uppsala University.

Results on pumices from Krakatau, Indonesia, show a variation of bending/stretching ratios in the range of 0.45 to 0.86, while the same ratios on the floating stone samples vary widely from 0.24 to 1.07. The experimentally fused sandstone glass shows a high bending/stretching ratio of 1.26. This implies that the floating stones of El Hierro are more heterogenous in their glass structure than the magmatic pumice samples analysed and are therefore likely of non-magmatic (i.e. sedimentary) origin.

References:
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