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Investigation of Carbon incorporation into Al 6061 alloys XIAOXIAO GE, LOURDES SALAMANCA RIBA, MANFRED WUTTIG, Univ of Maryland-College Park, COVETICS COLLABORATION — The incorporation of carbon nanostructures into aluminum alloys, such as Al6061 and Al7075, has the potential to further improve the mechanical, electrical and anti-corrosion properties of these alloys. We report on a novel method to incorporate up to 10.0 wt% carbon into the crystal structure of Al 6061 alloys to form a new material "Al Covetics". In this method, a DC current is applied to molten Al metal containing activated carbon particles. The current facilitates ionization of the carbon atoms and their bonding to each other, forming graphic chains and layers along preferential directions of the Al lattice. Raman mapping of the G and D peaks of graphitic carbon was used to confirm the role of the current in ensuring that the carbons remain in the metal by electro-static force and spread into the metal matrix evenly. Sp^2 bonding of carbon was found all over the surface in the Covetics. Carbon signals were also observed everywhere in Covetics with Energy Dispersive X-ray Spectroscopy. However, localized carbon signals were detected in samples made with activated carbon but without applying any current. The dependence of the mechanical, electrical and structural properties of Al Covetics on C content from 3 to 10 wt. % will be presented.

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