

International Conference on

MATERIALS SCIENCE & ENGINEERING

June 25-26, 2018 | Rome, Italy

The texture of zinc after direct extrusion

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Zinc belongs to metals with hexagonal closed packed structure (hcp); therefore, it possesses low plasticity, especially in the as-cast state. Because zinc based materials have been studied as potential biodegradable materials, there is a big interest in improving their mechanical properties. That can be done using thermomechanical treatment, for example by direct extrusion. In the case of extruded hcp metals, e.g. magnesium, significant texture of the products is observed (basal planes are parallel to the extrusion direction). Therefore, a similar effect of direct extrusion on zinc texture can be expected. On the other hand, zinc possesses a c/a ratio higher than $\sqrt{3}$ meaning that deformation mechanisms are limited only to basal slip and twinning at room temperature. Although the direct extrusion is usually performed at elevated temperatures and other deformation mechanisms can be activated, some differences may be observed compared to the hcp metals with lower c/a ratio (e.g. magnesium). In this work we produced a zinc wire with a diameter of 250 μm by a one-step direct extrusion with an extrusion ratio of 576 and we studied its microstructure using scanning electron microscopy and electron backscattered diffraction. To understand the microstructure evolution during the direct extrusion better, we extruded zinc single crystals in various

directions and observed their microstructure too. We also performed some other tests in order to find the mechanisms of microstructure evolution during the direct extrusion. We would like to thank to the Czech Science Foundation for the financial support of this research (project no. 18-06110S).

As-extruded Zn wire



Biography

Jaroslav Capek has completed his PhD in metallurgy at The University of Chemistry and Technology, Prague, Czech Republic in November 2016 at the age of 31 years. Currently he is working as a postdoctoral fellow at the Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic. He has published more than 15 papers in impacted journals and possesses h-index 7 (according to WOS).

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