

Nondestructive Characterization of Microstructures in Titanium Modified 20 % Cold Worked 316 Type Austenitic Stainless Steel using Photoacoustic Spectroscopy

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The photoacoustic (PA) technique is applied for the first time as a nondestructive tool to characterize microstructures in Ti modified and cold worked 316 type austenitic stainless steel. PA measurements were carried out on samples under solution annealed, cold worked, and heat treated conditions. Results indicate that there is a striking difference in the photoacoustic signal patterns in the cases of solution annealed and cold worked samples, whereas there is only a change in the amplitude of the photoacoustic spectrum observed in the cases of cold worked and heat treated samples. From the measured photoacoustic amplitudes, the thermal diffusivity and conductivity were calculated. Results of the PA measurements correlate well with the ultrasonic velocity measurements made earlier on similar cold worked and heat treated Ti modified stainless steel samples.