Khoirotun Nisa, 2016, **Synthesis and Characterization $FeTe_{1-x}S_x$ with Mechanical Alloying Method and Heat Treatment as a Superconducting Material**. Skripsi ini di bawah bimbingan Andi Hamim Zaidan, Ph.D. dan M. Ikhlasul Amal, Ph.D., Departemen Fisika, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

$FeTe_{1-x}S_x$ telah disintesis dengan metode pemaduan mekanik dan perlakuan panas sebagai material superkonduktor. Penelitian ini bertujuan untuk mengetahui pengaruh variasi komposisi S terhadap pembentukan fase, morfologi permukaan dan temperature kritis $FeTe_{1-x}S_x$ (x = 0,15 ; 0,20 ; 0,25 ; 0,30). $FeTe_{1-x}S_x$ disintesis dengan dua tahap yaitu *alloying* $Te_{1-x}S_x$ dengan waktu *milling* selama 1 jam dan BPR sebesar 1:1 kemudian dipanaskan pada temperatur 400^oC selama 12 jam dengan pemanasan bertahap. $FeTe_{1-x}S_x$ telah disintesis setelah alloying $Te_{1-x}S_x$ dengan teknik yang sama. Penambahan sulfur dari 15% hingga 30% menyebabkan penurunan komposisi fasa β- $FeTe_{1-x}S_x$. Pada semua sampel terdapat fasa pengotor $FeTe_2$ sedangkan pada komposisi sulfur 20% hingga 30% terdapat unsur Te. Morfologi permukaan $FeTe_{0,85}S_{0,15}$, $FeTe_{0,80}S_{0,20}$ dan $FeTe_{0,75}S_{0,25}$ berbentuk kepingan, pipih dan saling bertumpuk. Sedangkan morfologi permukaan $FeTe_{0,70}S_{0,30}$ berbentuk kepingan, bulat dan saling bertumpuk. Pada sampel $FeTe_{0,80}S_{0,20}$ dan $FeTe_{0,75}S_{0,25}$ juga menunjukkan terbentuknya gumpalan. $FeTe_{0,80}S_{0,20}$ menunjukkan adanya penurunan resistivitas pada temperatur 1,69 K sedangkan $FeTe_{0,75}S_{0,25}$ menunjukkan adanya penurunan resistivitas pada temperatur 1,76 K.

Kata kunci: $FeTe_{1-x}S_x$, pemaduan mekanik, perlakuan panas, pembentukan fasa

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ABSTRACT

$FeTe_{1-x}S_x$ was synthesized with mechanical alloying and heat treatment as superconducting material. This research was purposed to determine the effect of variations in S composition to the phase formation, morphology and critical temperature $FeTe_{1-x}S_x$ (x = 0.15; 0.20; 0.25; 0.30). $FeTe_{1-x}S_x$ was synthesized with two step alloying i.e. $Te_{1-x}S_x$ alloying by milling time of 1 hour and BPR= 1: 1 then heated at a temperature of 400^oC for 12 hours with multistep sintering process. $FeTe_{1-x}S_x$ was synthesized after $Te_{1-x}S_x$ alloy with the same techniques of the alloying $Te_{1-x}S_x$. The addition of sulfur from 15% to 30% was resulting reduction composition of β- $FeTe_{1-x}S_x$ phase. All samples contained $FeTe_2$ as impurities phase. Samples with sulfur composition of 20% to 30% contain an element of Te. Morphology of $FeTe_{0,85}S_{0,15}$, $FeTe_{0,80}S_{0,20}$ dan $FeTe_{0,75}S_{0,25}$ are plates, flat and cluster. Morphology of $FeTe_{0,70}S_{0,30}$ are plates, spherical and cluster. $FeTe_{0,80}S_{0,20}$ dan $FeTe_{0,75}S_{0,25}$ sample show aglomeration in part of morphology. $FeTe_{0,80}S_{0,20}$ showed a decrease in resistivity at temperature of 1.69 K and $FeTe_{0,75}S_{0,25}$ showed a decrease in resistivity at temperature 1.76 K.

Keywords: $FeTe_{1-x}S_x$, mechanical alloying, heat treatment, phase formation