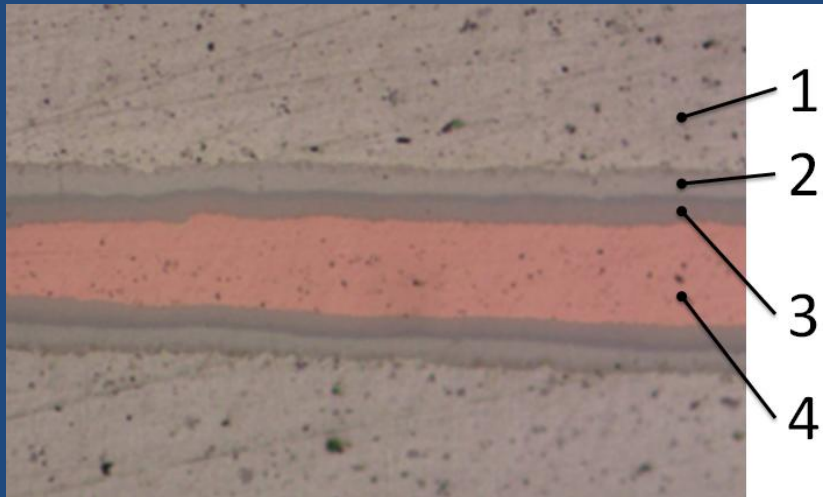


FORMATION OF INTERMETALLIC
INTERLAYERS IN EXPLOCLAD
AL-CU COMPOSITES:
CALCULATED KINETHIK
PARAMETERS

A.V. Khorin, A.V. Pryshchak , D.L. Chernyshov and A.P. Pen'shin

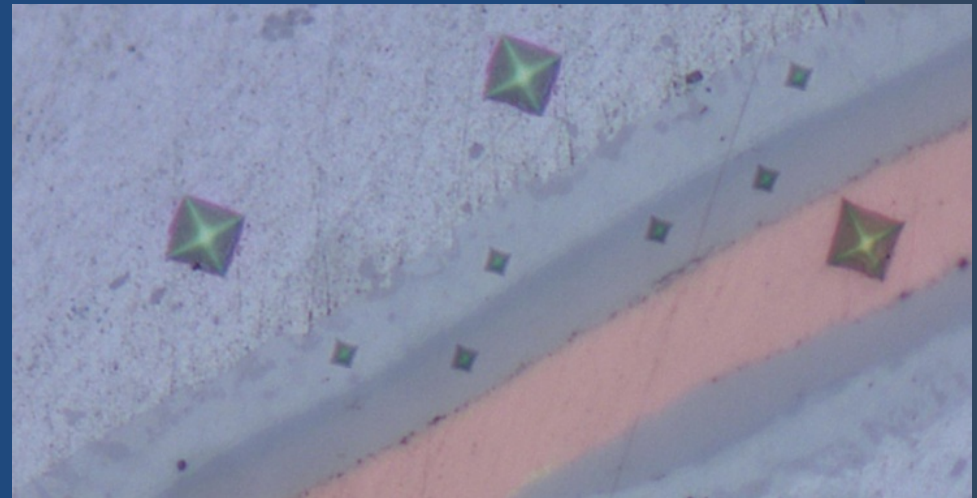
Penza State University, 2016

The composite microstructure after heat treatment



× 200

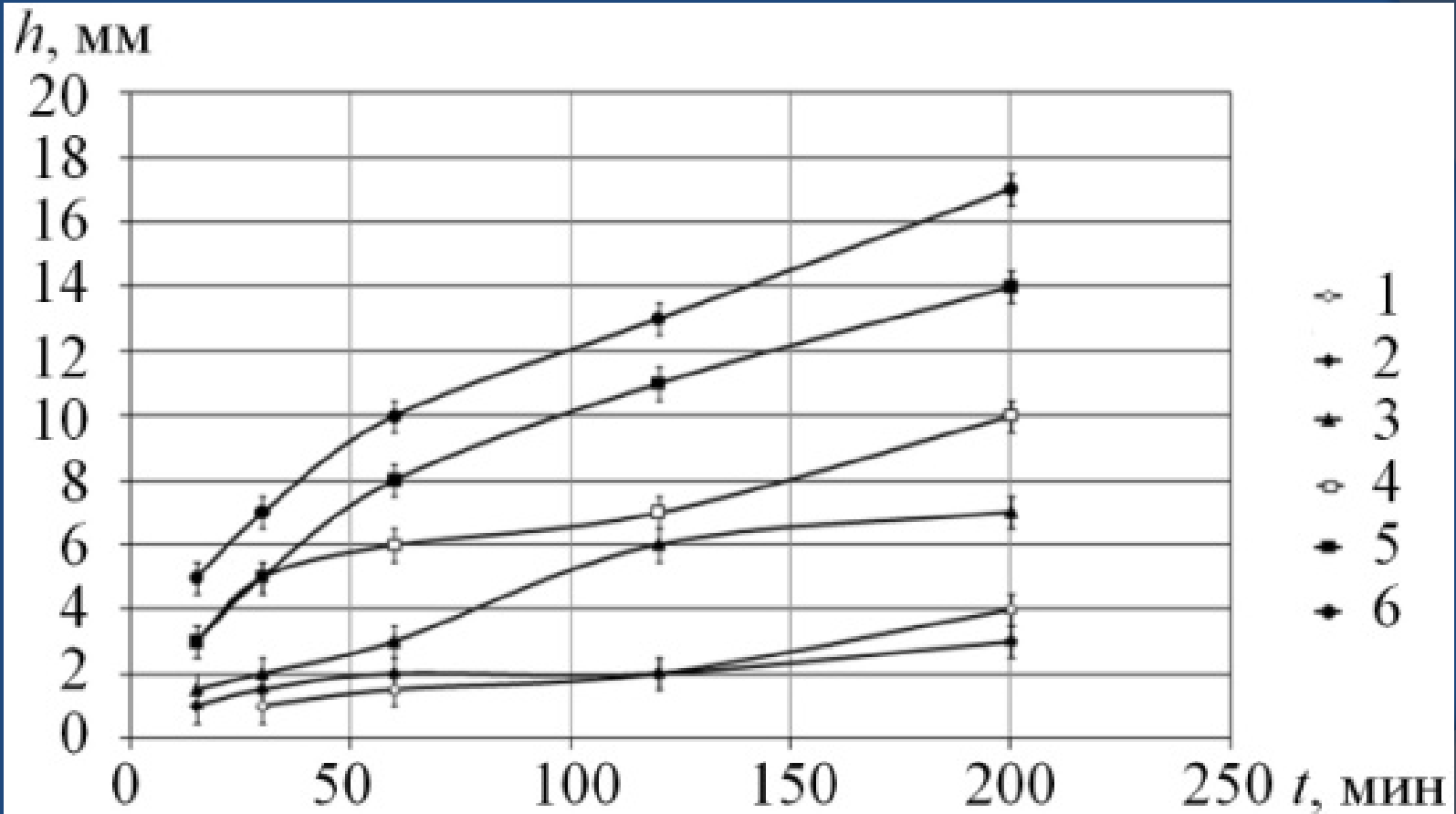
1 – aluminum matrix; 2 – phase CuAl_2 ;
3 – phase CuAl ; 4 – copper fiber



× 200

phase CuAl_2 9,5 ... 10,5 GPa
phase CuAl 6,0...7,5 GPa

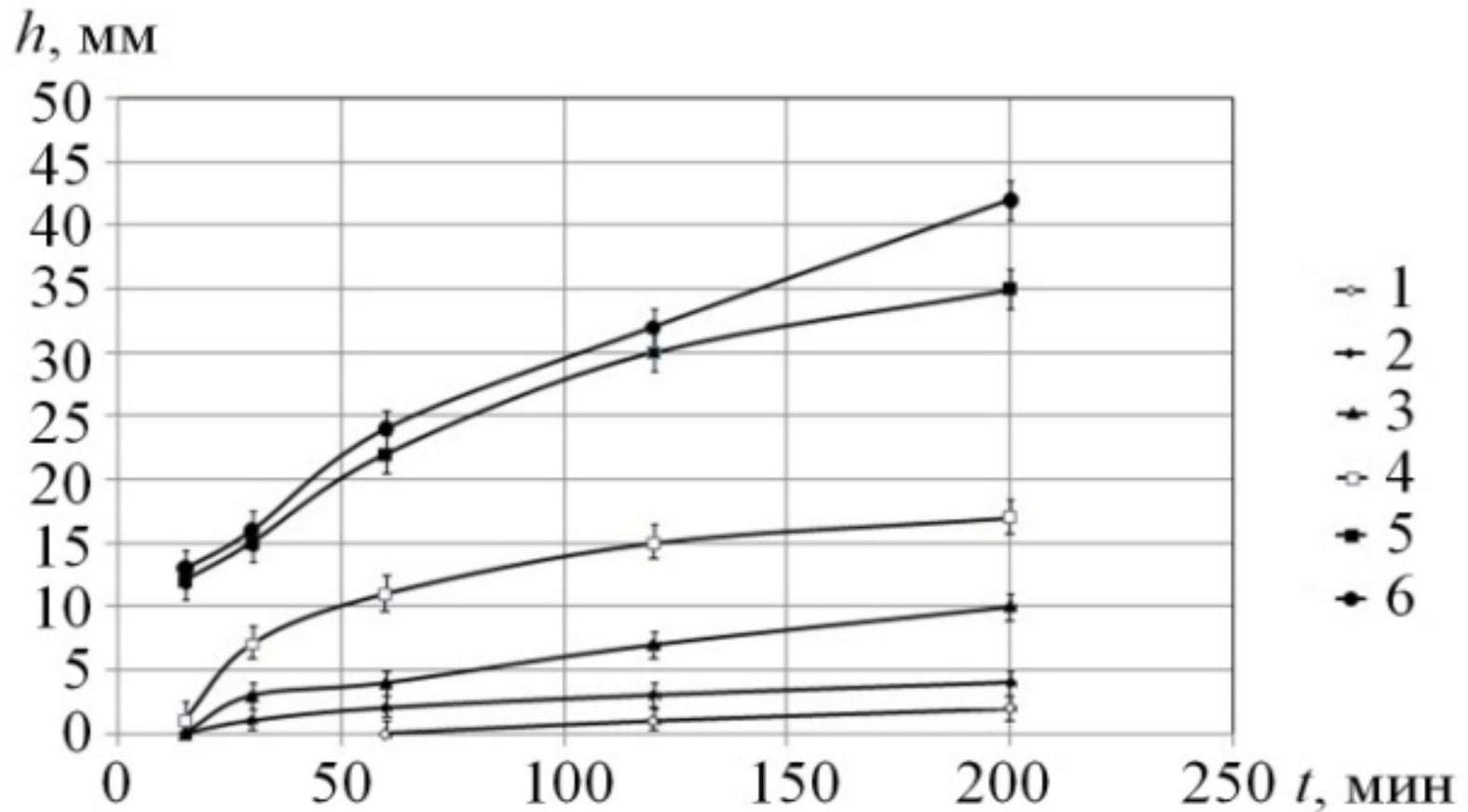
Thickening of intermetallic interlayers at interfaces of Al-Cu composites



Phase CuAl

1 – 300 °C; 2 – 350 °C; 3 – 400 °C; 4 – 450 °C; 5 – 500 °C; 6 – 510 °C

Thickening of intermetallic interlayers at interfaces of Al-Cu composites



Phase CuAl_2

1 – 300 °C; 2 – 350 °C; 3 – 400 °C; 4 – 450 °C; 5 – 500 °C; 6 – 510 °C

Calculated kinetic values of intermetallic phases

Phase	Nucleation energy E_3 , J/mole	Pre-exponent coefficient t_0	Activation energy E_a , J/mole	Diffusion coefficient D_0 , MKM^2/c	
				400 °C	450 °C
CuAl	47721,0	0,321	150289,0	$3,6 \cdot 10^{-19}$	$5,1 \cdot 10^{-18}$
CuAl ₂	41130,0	0,319	96294,0	$9,4 \cdot 10^{-16}$	$5,1 \cdot 10^{-15}$

Calculated values of intermetallic phases

Duration of thermal treatment, hours	Thickness of intermetallic phase CuAl, MKM		Thickness of intermetallic phase CuAl ₂ , MKM	
	400 °C	450 °C	400 °C	450 °C
4,0	11,1	18,8	7,7	11,0
6,0	13,7	23,2	9,5	13,6
8,0	16,0	27,0	11,0	15,7
10,0	18,0	30,2	12,3	17,6

Thank you
for attention!

E-mail: metal@pnzgu.ru

Phone/fax: 7-8412-368453