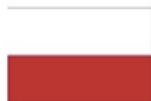




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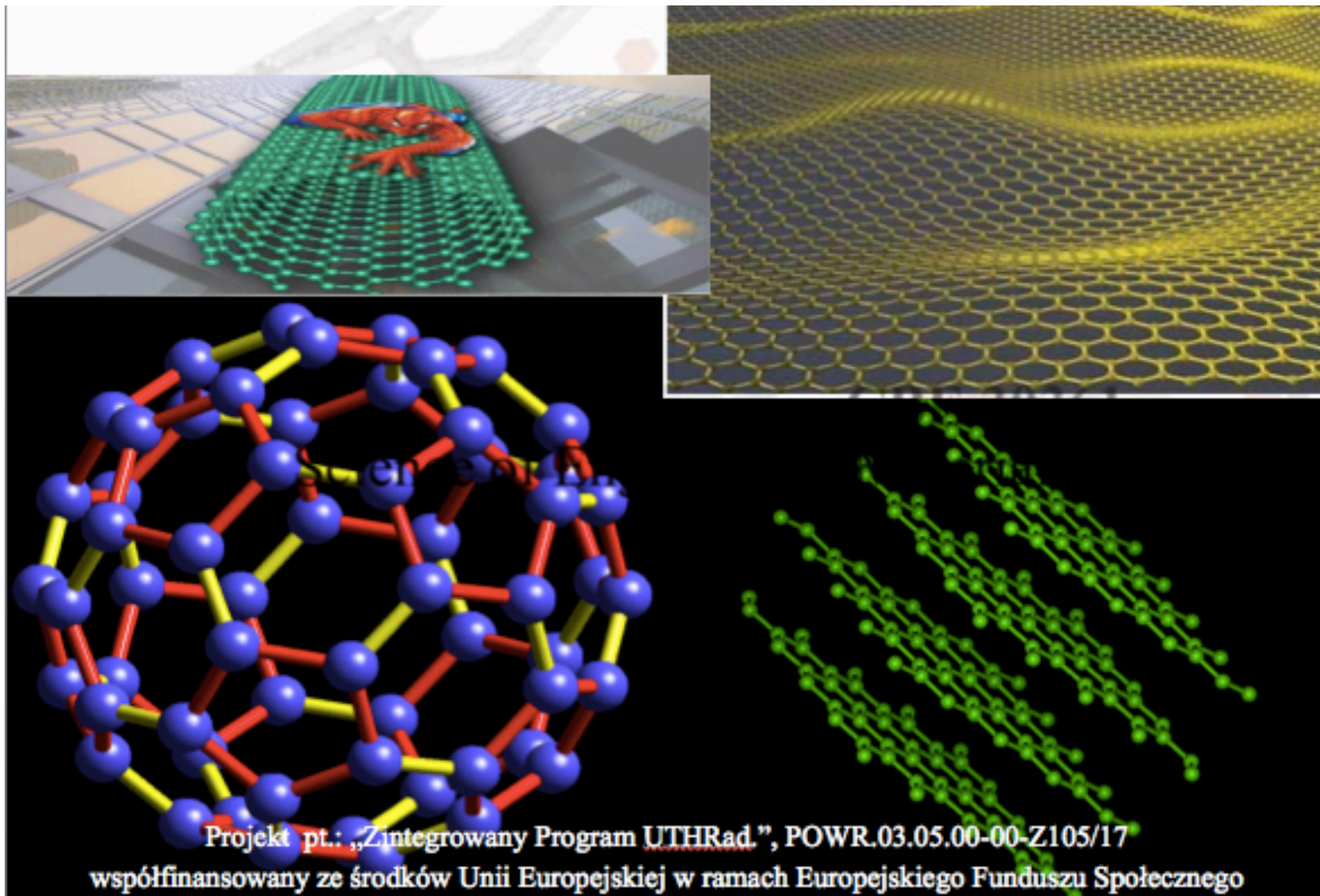


Rzeczpospolita
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UNIWERSYTET
TECHNOLOGICZNO-HUMANISTYCZNY
im. Kazimierza Pułaskiego w Radomiu

Unia Europejska
Europejski Fundusz Społeczny



Course Number:1

Course Title: Science of Engineering Materials

Lecture №04

Composite materials based on carbides of refractory materials.

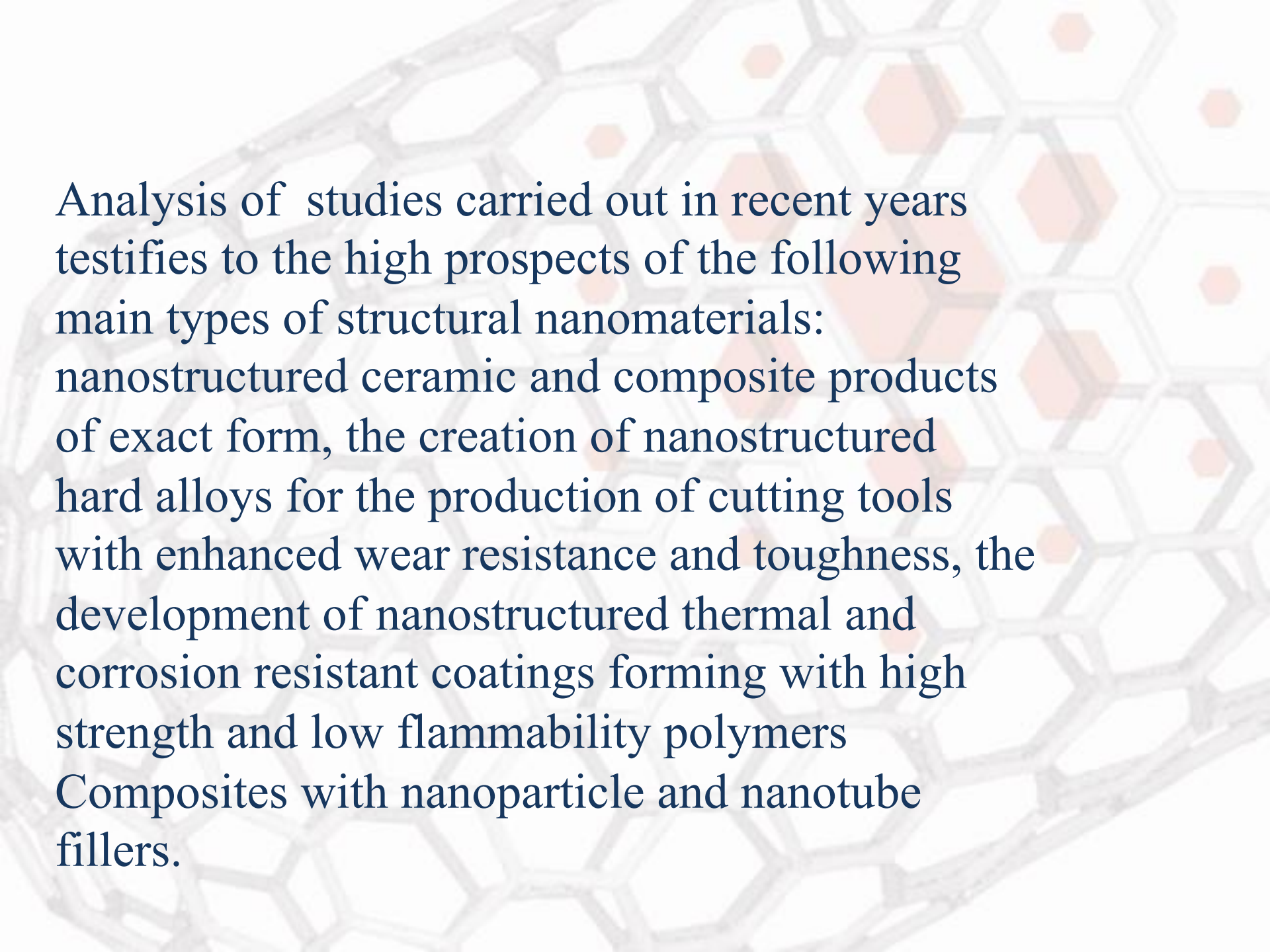
Instructor: Dr.prof.Edwin Gevorkyan

Office: UkrSUT

E-mail: cermet-u@mail.com;

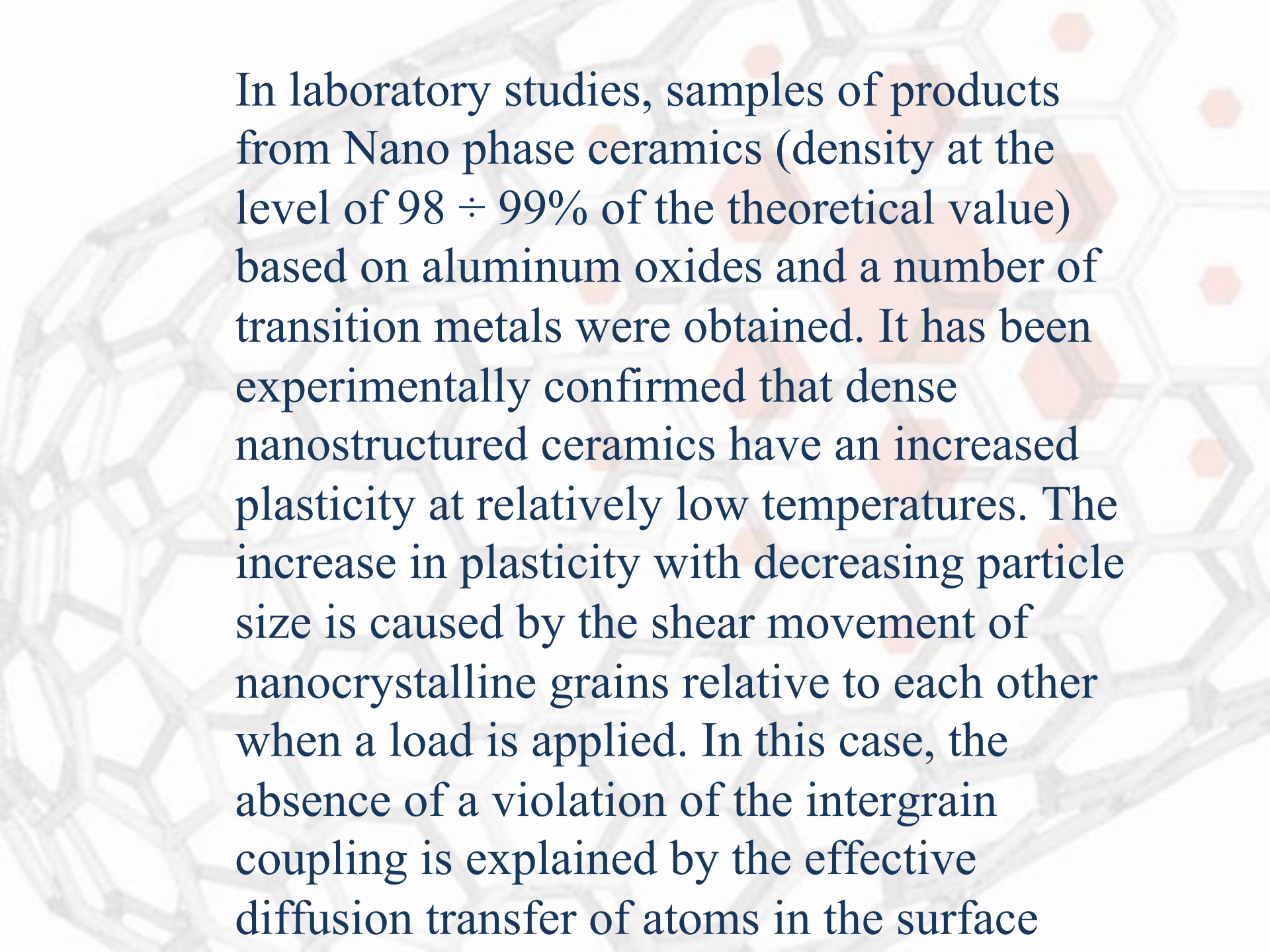
Website: www.cermet-u.com.ua

Website: <http://kart.edu.ua/ru>



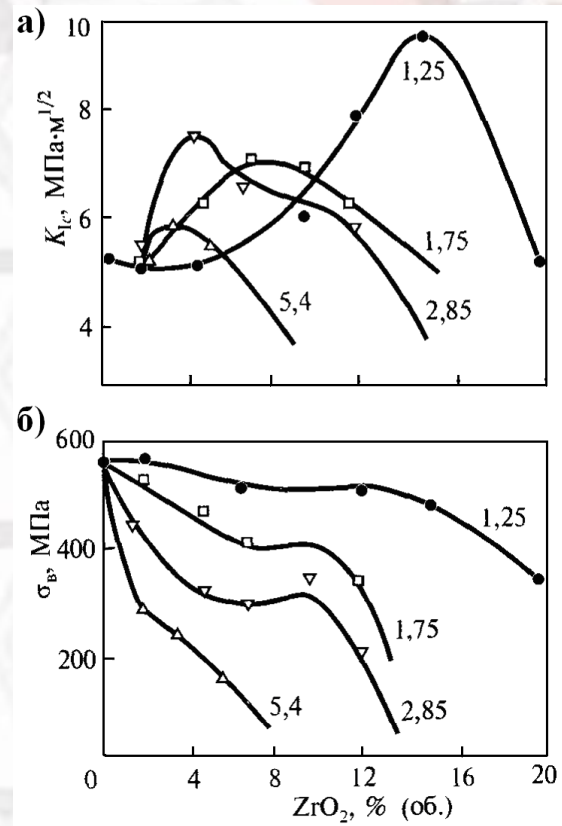
Analysis of studies carried out in recent years testifies to the high prospects of the following main types of structural nanomaterials:

- nanostuctured ceramic and composite products of exact form, the creation of nanostructured hard alloys for the production of cutting tools with enhanced wear resistance and toughness, the development of nanostructured thermal and corrosion resistant coatings forming with high strength and low flammability polymers
- Composites with nanoparticle and nanotube fillers.



In laboratory studies, samples of products from Nano phase ceramics (density at the level of $98 \div 99\%$ of the theoretical value) based on aluminum oxides and a number of transition metals were obtained. It has been experimentally confirmed that dense nanostructured ceramics have an increased plasticity at relatively low temperatures. The increase in plasticity with decreasing particle size is caused by the shear movement of nanocrystalline grains relative to each other when a load is applied. In this case, the absence of a violation of the intergrain coupling is explained by the effective diffusion transfer of atoms in the surface

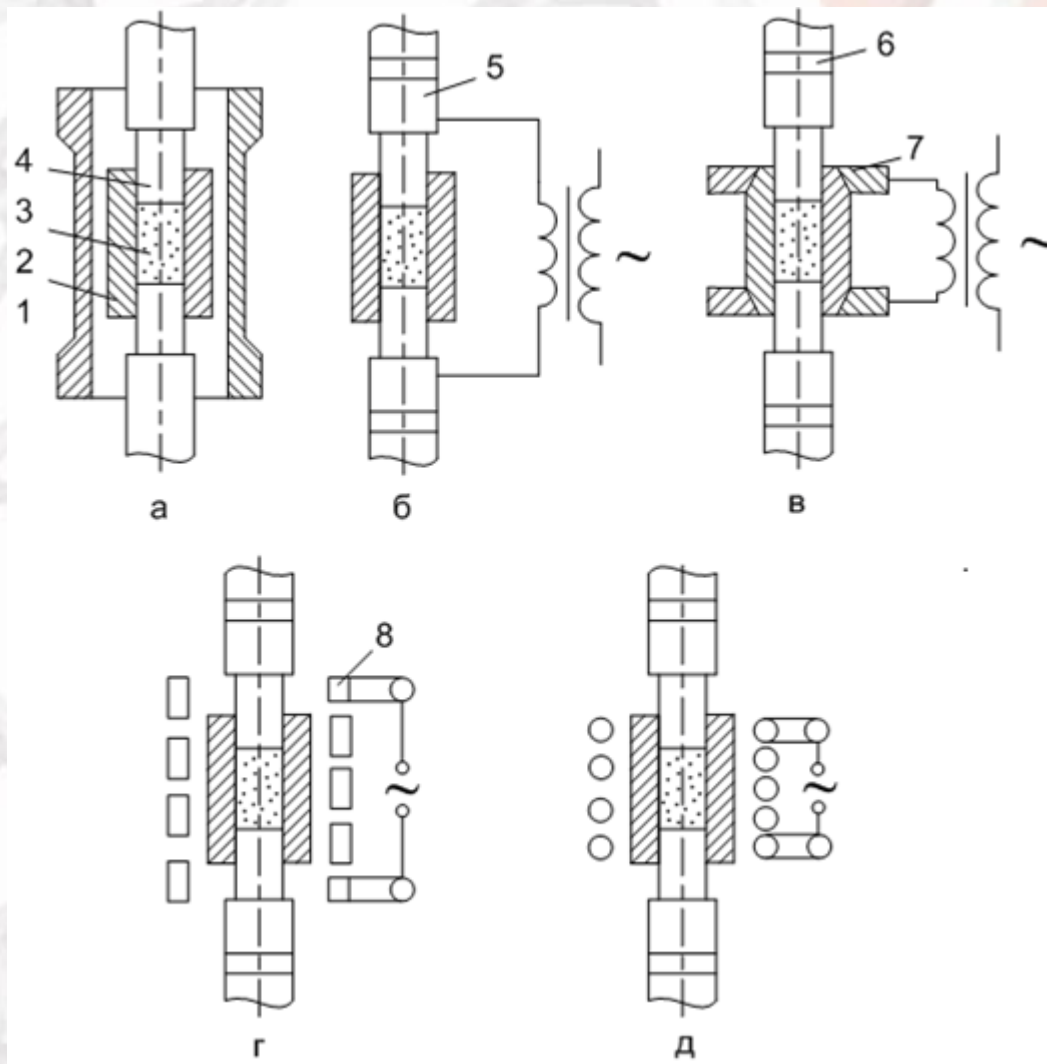
Influence viscosity and strength from the content ZrO_2 in SiC



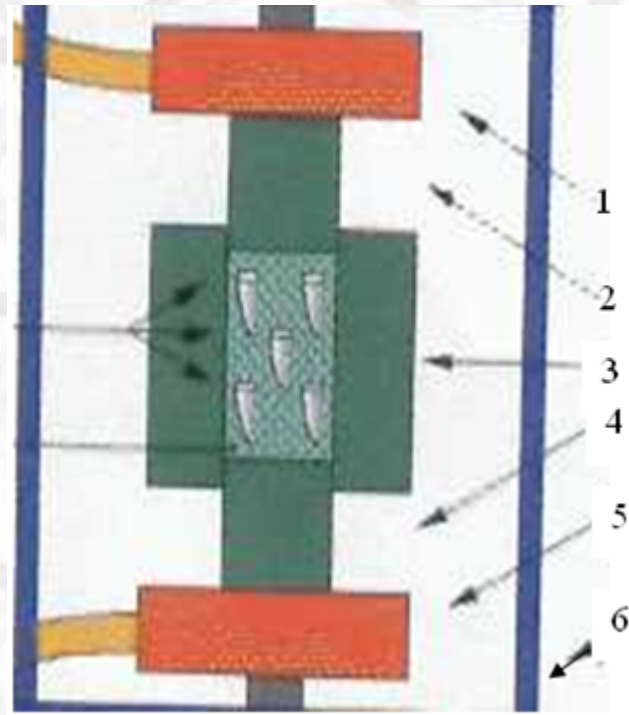
WC –Co composite properties

Кермет	$d_V, \text{г/см}^3$		HRA		$\sigma_{\text{сж}}, \text{МПа}$		$\dot{I}_{\text{н}}, \text{А/м}$	
	ГП	С	ГП	С	ГП	С	ГП	С
БК6	15	14,9	90,5	89,0	1568	1617	1194	995
	-	14,8	-	88,5	-	1422	-	-
БК15	14	-	88,5	-	-	-	8800	-
	-	14,0	-	86,0	-	1765	-	-
ТН-20	5,3	-	91,0	-	-	-	8080	-
	-	5,6	-	91,0	-	1120	-	-
ТНМ-30	5,6	-	90,0	-	1225	-	4140	-
КНТ-1	5,6	-	86,0	-	-	-	4400	-
КХН-15	6,6	-	92,0	-	-	-	8000	-

Hot pressing scheme



Hot quazi-isostatic pressing



Ultrasonic hot pressing

