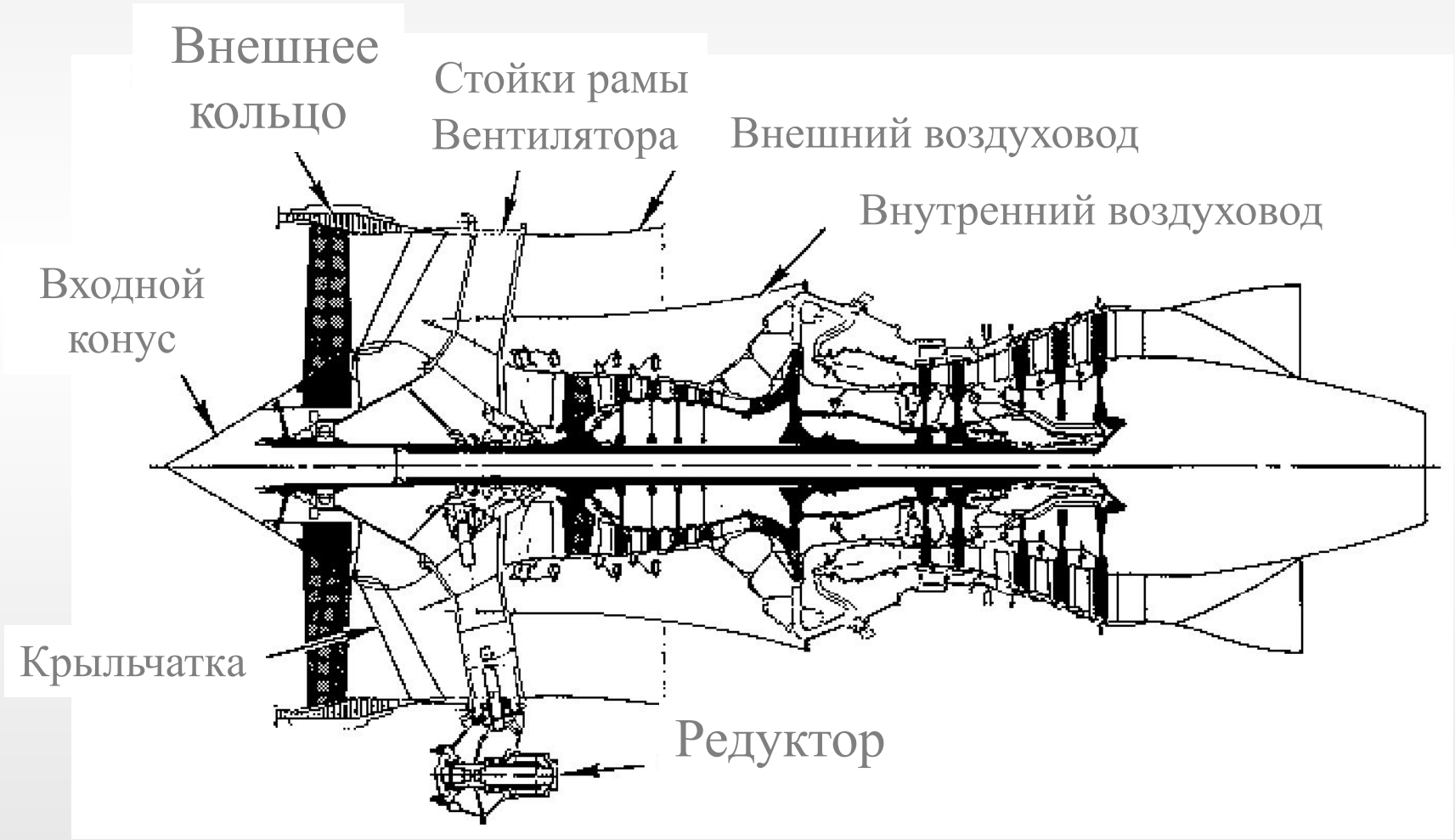
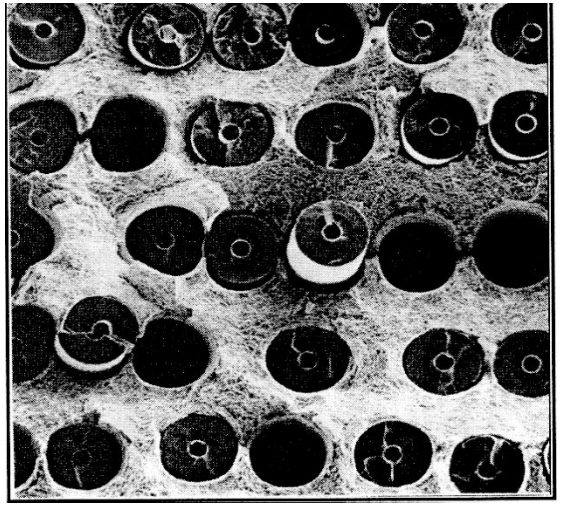
Применение Полимерных Композитов

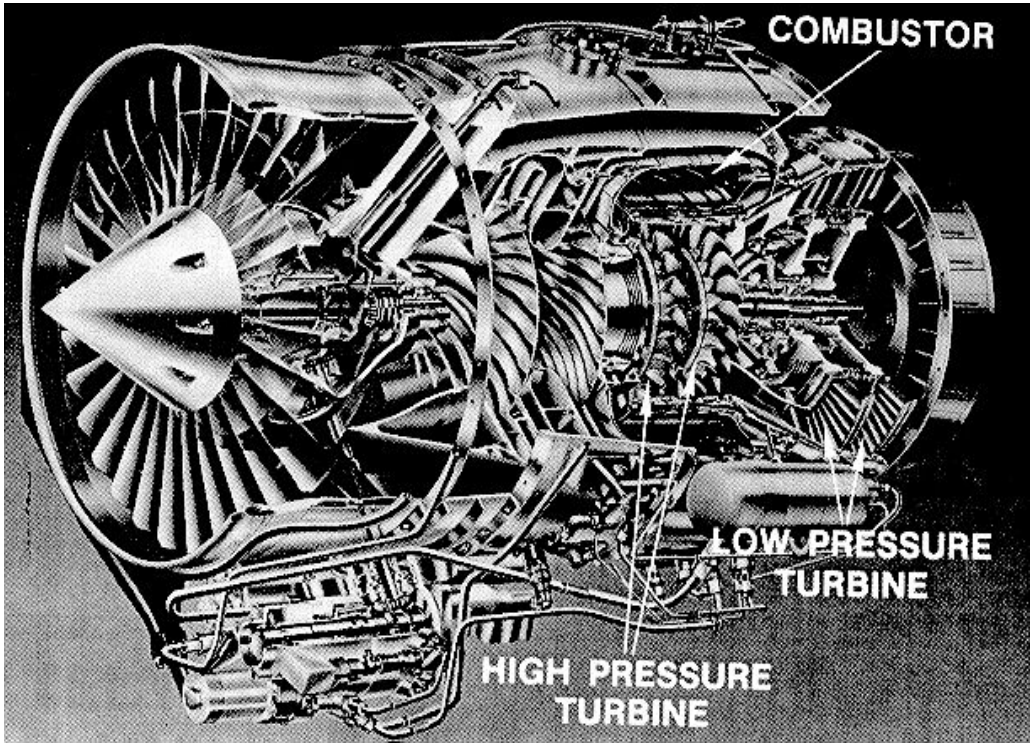


Титановые Композиты (ММС)

Пример Ti/SiC Композита
100X



Требования к материалам горячей секции

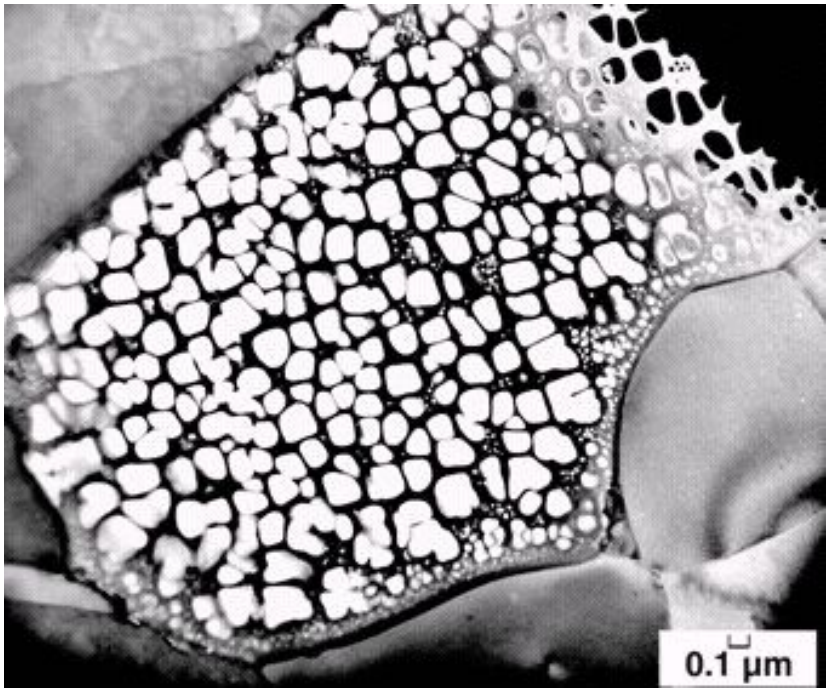


Составы Суперсплавов

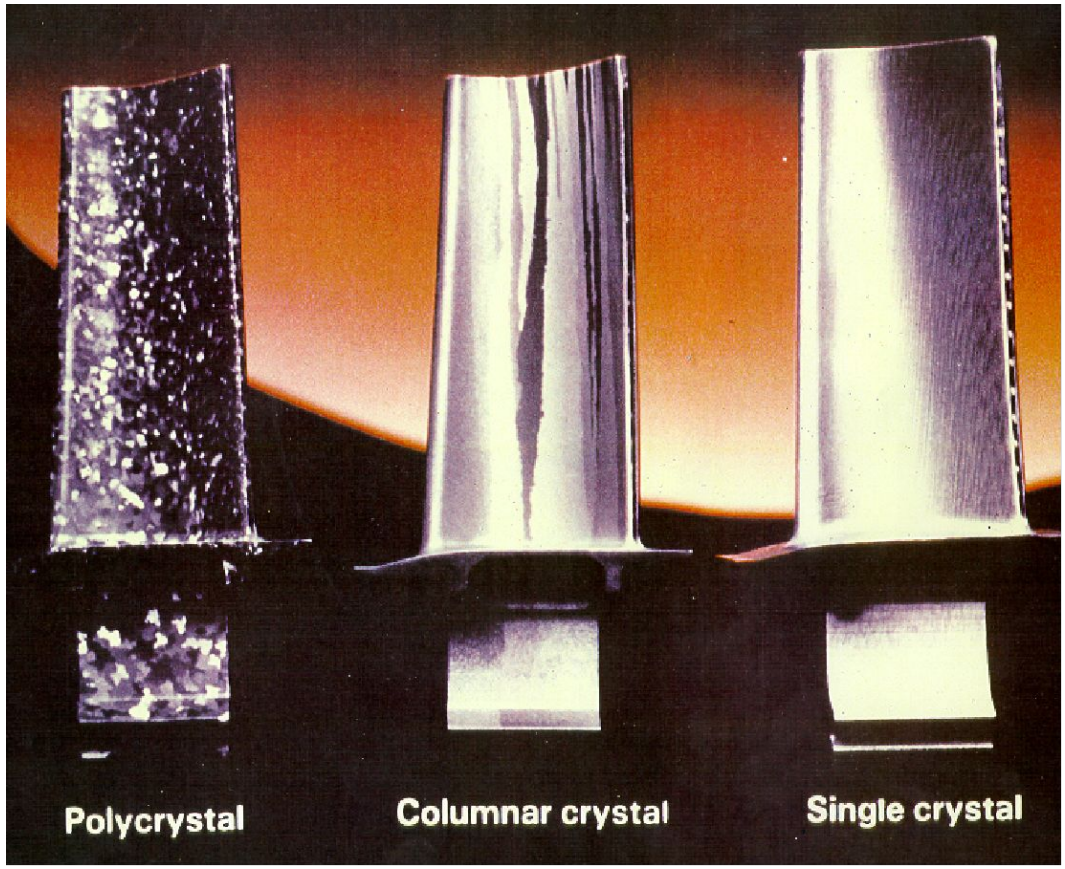
Химический состав, вес %

	Ni	Cr	Co	Mo	W	Ta	Cb	Al	Ti	C	Zr	Hf
TURBINE BLADE ALLOYS												
ALLOY 713C	BAL	12.5		4.2			2.0	6.1	0.8	0.12	0.10	
MAR-M 247	BAL	8.2	10.0	0.6	10.0	3.0		5.5	1.0	0.20	0.09	1.5
CMSX - (SC)	BAL	8.0	4.6	0.6	8.0	6.0		5.6	1.0			0.1
TURBINE DISK ALLOYS												
WASPALOY	BAL	19.5	13.5	4.3				1.3	3.0	0.006	0.06	
RENE' 95	BAL	14.0	8.0	3.5	3.5		3.5	3.5	2.5	0.01	0.05	
COMBUSTOR ALLOYS												
HASTELLOY X	BAL	22.0	1.5	9.0	0.6							
INCONEL 617	BAL	22.0	12.5	9.0				1.0				

Микроструктура Суперсплава

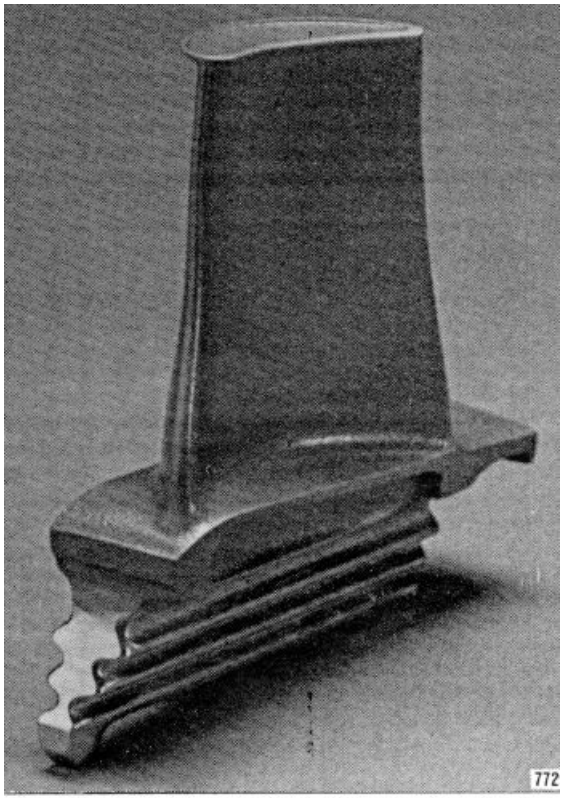


Контроль структуры зерен в лопатках турбин:



Равнонаправ-ленная | Направленно выращенная (DS) | Монокристал-лическая (SX)

Неметаллы - Керамика

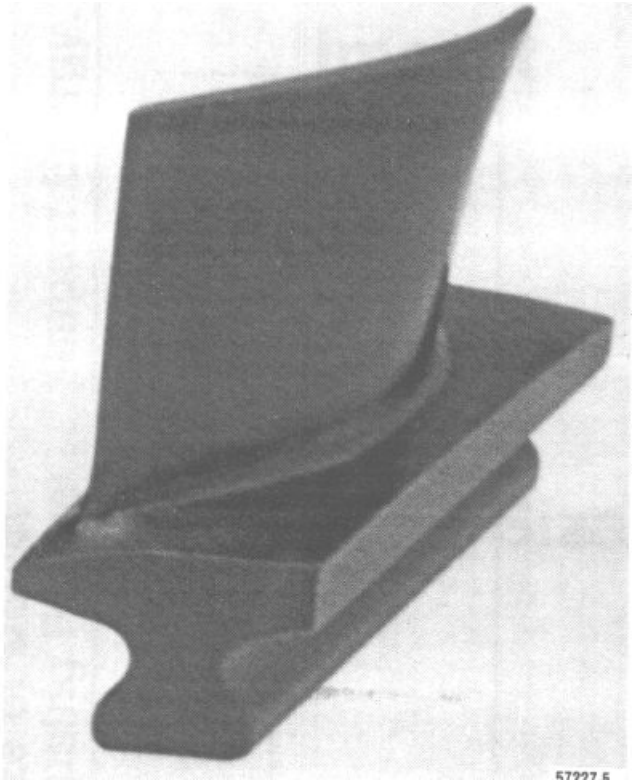


Суперсплав

- Кобальт
- Никель
- Хром
- Вольфрам
- Тантал

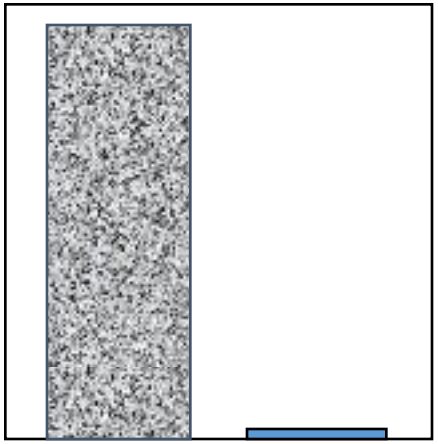
- Кремний
- Азот
- Углерод

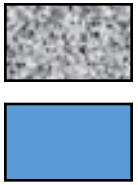
Керамика



Керамика - Проблемы

Пластичность (Вязкость)

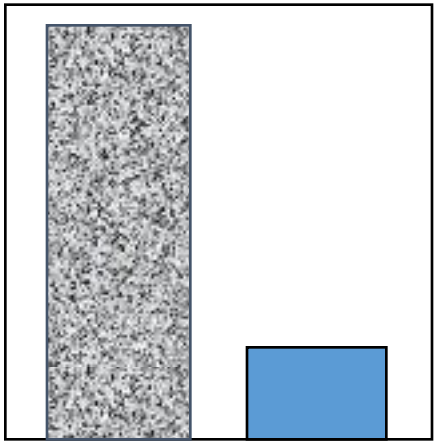




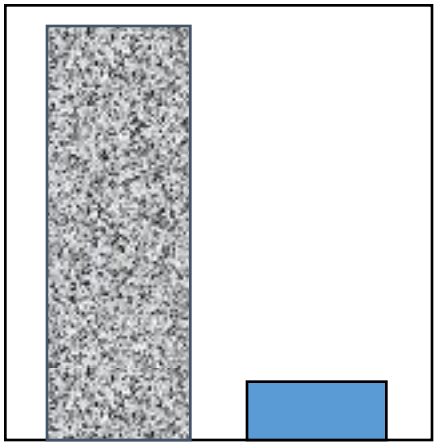
Суперсплавы

Керамика

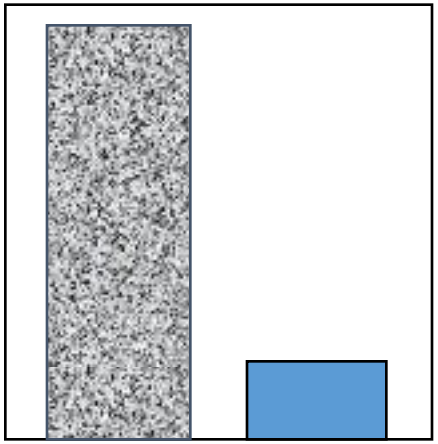
Ударная прочность

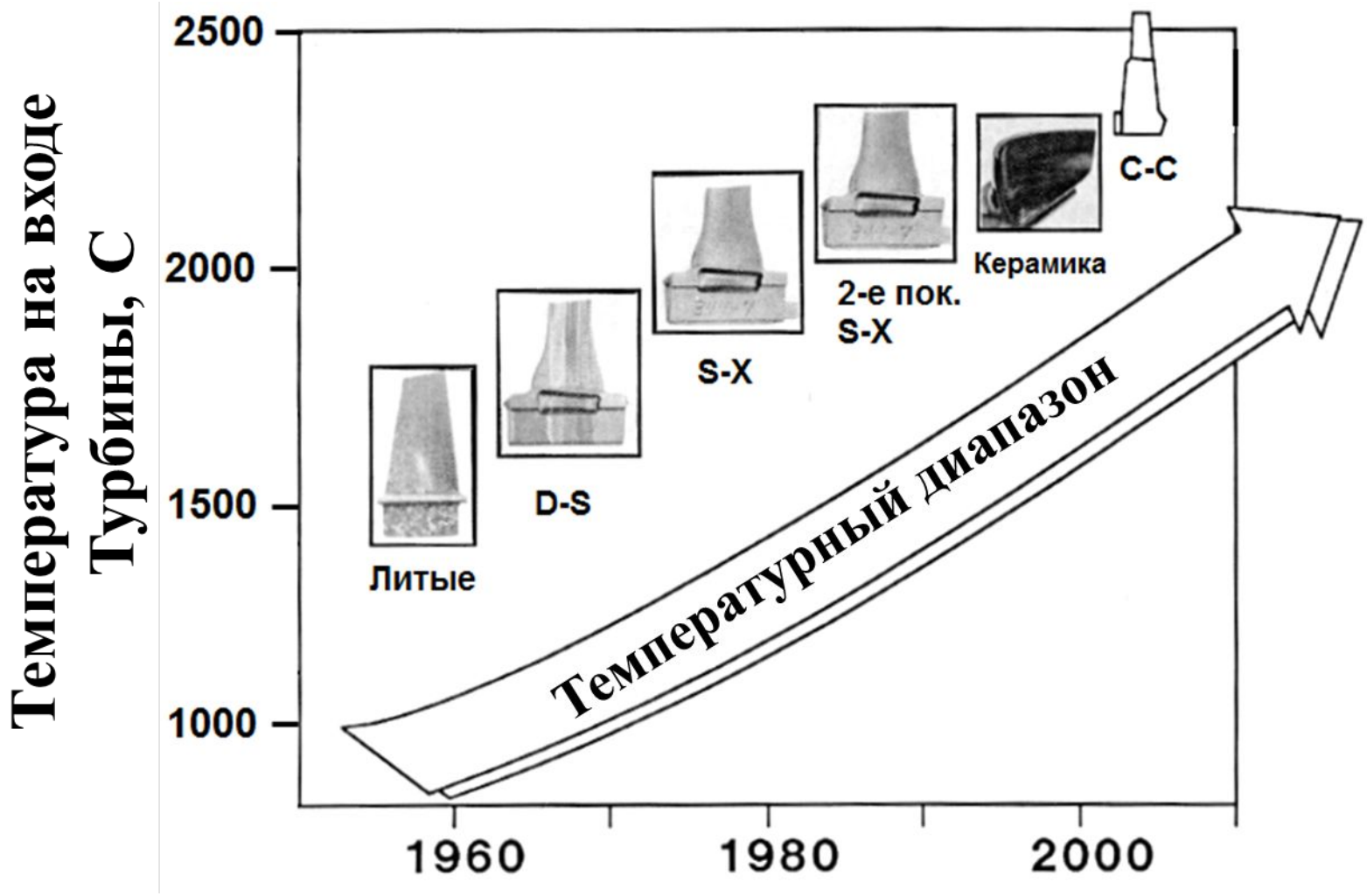


Ударная вязкость



Размер Критической Трещины



Керамические Композиты

Хроника материалов