

# Евгений Павлович Романов



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Ушел из жизни **Евгений Павлович Романов**, член-корреспондент РАН, доктор физ.-мат. наук, профессор, ведущий специалист в области физического материаловедения, физикохимии и технологии композиционных материалов, прецизионной металлургии сплавов, сталей и интерметаллических соединений, выращивания монокристаллов.

Е.П. Романов родился 1 июля 1937 г. в городе Пржевальске Киргизской ССР. В 1959 г. после окончания металлургического факультета Уральского политехнического института имени С.М. Кирова Е.П. Романов пришел на работу в Институт физики металлов АН СССР. В 1987 г. он стал руководителем отдела прецизионной металлургии и лаборатории интерметаллидов и монокристаллов.

Первые работы Е.П. Романова были связаны с приготовлением и изучением сплавов бериллия с легирующими добавками и электротехнического сплава In-Mg, у которого во время эксплуатации в качестве контактов росли металлические «усы» с прочностью, близкой к теоретической. В начале 1960-х годов, когда начался бум по исследованию сплавов Ti-Nb, Zr-Nb с высокими сверхпроводящими свойствами, Е.П. Романов с коллегами включился в исследование тонкой структуры и сверхпроводящих свойств этих материалов. В эти годы Романовым с коллегами был предложен и всесторонне изучен модельный сплав Zr-4 вес.% Nb, в котором в результате термической обработки по границам мартенситных игл в виде цепочек выделяется практически чистый сверхпроводник (ниобий). Меняя обработку, можно было изменять структуру сплава в широком диапазоне и наблюдать ее влияние на сверхпроводящие свойства. Тогда впервые получила экспериментальное подтверждение нитяная модель жесткого сверхпроводника, что вызвало большой интерес и одобрение научной общественности страны.

В 1975 г. группа Е.П. Романова начала совместные работы с ВНИИ Неорганических материалов имени академика А.А. Бочвара, г. Москва – основным разработчиком сверхпроводящих материалов (Nb-Ti, Cu-Sn/Nb<sub>3</sub>Sn) в СССР в то время. Совместные работы с этим институтом продолжались более трех десятилетий. В результате была создана научная основа получения сверхпроводящих материалов промышленного назначения. Сначала были изучены свободные бронзы с высоким содержанием олова, которые необходимы для создания композитов Cu-Sn/Nb. Были установлены и устранены причины их очень высокой хрупкости.

Выявлены особенности пластической деформации этих бронз в условиях композитов, предложены режимы деформации, повышающие пластичность бронз в композитах. С помощью электронно-микроскопического исследования структуры композитов Cu-Sn/Nb, Cu-Ga/V установлен механизм образования сверхпроводящих слоев Nb<sub>3</sub>Sn, V<sub>3</sub>Ga. Предложен двухступенчатый термический отжиг композитов, который обеспечил улучшение структуры и сверхпроводящих свойств диффузионных слоев (новизна подтверждена патентом), этот отжиг используется до сих пор. Со временем появилась необходимость использовать композиты на основе Nb<sub>3</sub>Sn в высоких магнитных полях (20 Тл и выше). Этого можно было достичь только с помощью легирования композитов различными добавками. В связи с этим возникло целое направление по изучению механизма влияния разнообразных добавок на структуру и сверхпроводящие свойства композитов. В результате были установлены наиболее легирующие элементы (Ti и Ta).

Отдельное направление составило исследование высокопрочных нанокompозитов Cu-Nb с высокой электропроводностью, которые разрабатываются во ВНИИНМ. В результате проведенных исследований в проволочных образцах обнаружена особая плоскостная текстура Nb-волокон, обеспечивающая необычные свойства этих материалов. Благодаря тесной связи с ВНИИНМ полученные данные оперативно использовались для корректировки технологии изготовления сверхпроводящих композитов и высокопрочных композитов Cu-Nb. В 2008 г. Россия вошла в проект создания Интернационального термоядерного реактора как поставщик сверхпроводящих композитов на основе Nb<sub>3</sub>Sn, и в этом есть немалый вклад коллектива, руководимого Е.П. Романовым. После открытия высокотемпературной сверхпроводимости (1987 г.) коллектив под руководством Е.П. Романова включился в работу по исследованию ВТСП-материалов. Сначала была исследована керамика Y-Ba-Cu-O, затем композиты на основе керамики Bi, Pb-2223 с высокими сверхпроводящими свойствами (совместно с ВНИИНМ). Путем сравнительного исследования тонкой структуры и сверхпроводящих свойств были определены элементы структуры, отрицательно и положительно влияющие на критический ток. В совместной работе с МГУ имени М.В. Ломоносова установлены особенности структуры тонкопленочных композитов на основе Y-Ba-Cu-O второго поколения, которые обеспечивают в пленках критическую плотность тока на два порядка выше, чем в монокристаллах. Изучена стабильность напыленных пленок и массивных образцов Y-Ba-Cu-O в зависимости от действия окружающей среды и атмосферы, содержания кислорода, низкотемпературного отжига. Установлены причины нестабильности и структурные изменения, которые ее сопровождают.

В последнее время Е.П. Романов являлся руководителем темы, связанной с созданием высокоплотных сверхпроводников MgB<sub>2</sub> и композитов на их основе.

В научной школе Е.П. Романова выполнен большой объем работ по синтезу и исследованию структуры и свойств различных интерметаллидов (Al<sub>15</sub>, C<sub>15</sub> и т.д.), магнитных сплавов, радиационному воздействию на структуру сверхпроводников, выращены монокристаллы тугоплавких металлов рекордной чистоты и совершенства; развиты фрактальный подход к анализу структурных преобразований и кинетических явлений в твердых телах и стеклокерамический метод формирования протяженных ВТСП изделий. Длительное время Е.П. Романов с сотрудниками занимался проблемами жаропрочных материалов, выплавкой их в поли- и монокристаллическом состоянии, изучением влияния легирующих и модифицирующих добавок на их структуру и свойства. Исследованные сплавы включают суперсплавы на основе никеля, соединения Ti<sub>3</sub>Al и TiAl. Находясь на стажировке в ФРГ в 1976 и 1978 гг. Е.П. Романов впервые сформулировал идею создания естественных волокнистых сверхпроводящих композитов (Cu-Nb, Cu-Sn-Nb) с помощью быстрой направленной кристаллизации в сочетании с пластической деформацией и диффузионным отжигом.

Е.П. Романов – автор более 300 научных работ, он подготовил одного доктора и 10 кандидатов наук, причем пять кандидатов и доктор наук защищались по сверхпроводящей тематике. В течение 35 лет Е.П. Романов преподавал физику конденсированного состояния и методы получения кристаллов и особо чистых веществ в Уральском государственном университете имени А.М. Горького. В 1996 г. ему присвоено почетное звание «Заслуженный деятель науки РФ». В настоящее время он является научным руководителем отдела прецизионной металлургии ИФМ УрО РАН.

В 1986 г. ему была предложена должность главного ученого секретаря вновь создаваемого Уральского отделения Академии наук СССР, (с 1990 г. Российской академии наук). На этой должности он проработал более двадцати лет. Евгений Павлович известен как крупный организатор науки. При его непосредственном участии были организованы ряд институтов и научные центры в городах Пермь, Оренбург, Ижевск, Сыктывкар

и др. Более пятнадцати лет Е.П. Романов был ученым секретарем научного комитета, исполнительным директором и членом попечительского совета Международного Научного Демидовского Фонда.

Источник:

<http://www.imp.uran.ru/?q=ru/content/chlen-korrespondent-ran-romanov-evgeniy-pavlovich>

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