Рафик Мамедович Имамов

(1938 – 2018)

Ушел из жизни доктор физико-математических наук, профессор, заслуженный деятель науки РФ, крупный специалист в области исследования атомной и реальной структуры вещества методами дифракции электронов и рентгеновского излучения **Рафик Мамедович Имамов.**

В 1961 году Р.М. Имамов окончил физический факультет Азербайджанского государственного университета по кафедре строения вещества. В марте 1962 года был принят в аспирантуру Института кристаллографии АН СССР, в лабораторию электронографии, где под руководством основателя советской электронографической школы З.Г. Пинскера, еще будучи студентом, выполнил дипломную работу. В этот период Р.М. Имамов приступил к исследованию строения тонких пленок полупроводниковых соединений методом электронографического структурного анализа. По итогам выполненных работ в 1965 году успешно защитил кандидатскую диссертацию и был оставлен в Институте для продолжения исследований в области структурной электронографии.

С 1965 по 1978 гг. Р.М. Имамов совместно с З.Г. Пинскером, С.А. Семилетовым, А.А. Завьяловой, А.С. Авиловым, Л.И. Ман и другими выполнил важный цикл работ по исследованию дифракции электронов и установлению атомной структуры тонких пленок многочисленных двух- и трехкомпонентных полупроводниковых соединений. Исследования Р.М. Имамова на нескольких модельных структурах существенно прояснили многие важные для электронографического структурного анализа вопросы. Это относится, в первую очередь, к учету количественного вклада динамических эффектов в интенсивность отражений, к влиянию этих эффектов на такие результаты структурных определений, как локализация легких атомов в структуре, а также определение степени заполнения кристаллографических положений атомами в случае фаз переменного состава. Результаты, полученные при исследовании характера рассеяния электронов в поликристаллических пленках, дали практике электронографического структурного анализа полное и достаточно убедительное доказательство применимости кинематического приближения для расшифровки атомной структуры кристаллов различной сложности.

Нельзя не отметить выполненное кристаллохимическое обобщение полученных структурных результатов: вскрыты закономерности строения кристаллических структур полупроводниковых фаз с октаэдрической координацией атомов; установлено существование своеобразного явления – композиционного политипизма, заключающегося в образовании большого числа упорядоченных твердых растворов при растворении металлической компоненты в соединениях со структурой

теллурида висмута. Эти результаты составили предмет докторской диссертации "Дифракция электронов и ее применение к расшифровке структуры полупроводников", которую Р.М. Имамов успешно защитил в 1978 году.

Начиная с 1976 года, Рафик Мамедович систематически занимался разработкой новых методов исследования структурного совершенства тончайших приповерхностных слоев кристаллов, основанных на нестандартных схемах дифракции рентгеновских лучей и выхода вторичных излучений (фотоэлектронов, флуоресцентных квантов и др.). Этому в значительной степени способствовала активная деятельность его учителя З.Г. Пинскера в области динамической теории рассеяния рентгеновских лучей в совершенных монокристаллах. Учитывая большое значение этих исследований для проблем микроэлектроники, в 1980 году совместным приказом-распоряжением Президиума АН СССР и Министерства электронной промышленности СССР на базе руководимой Р.М. Имамовым исследовательской группы была создана лаборатория дифрактометрии кристаллических слоев, в организации которой большую роль сыграл академик Б.К. Вайнштейн, чл.-корр. А.М. Афанасьев и П.А. Александров. За короткое время был создан коллектив, способный творчески решать сложные задачи на самом современном уровне. Совместно с А.М. Афанасьевым при участии сотрудников и аспирантов лаборатории были выполнены фундаментальные исследования в области физики дифракции рентгеновских лучей, выявлены возможности метода стоячих рентгеновских волн в изучении тонких слоев и границ раздела. Результаты этих исследований стали основой разработанных Р.М. Имамовым совместно с А.М. Афанасьевым и сотрудниками лаборатории новых методов исследования структуры наноразмерных кристаллических слоев и аппаратуры для их реализации. Среди них – метод асимптотической брэгговской дифракции; новые дифракционные схемы в условиях скользящего падения и полного внешнего отражения рентгеновских лучей; однокристальная реализация метода асимптотической брэгговской дифракции, двухканальный метод стоячих рентгеновских волн (фотоэлектроны и флуоресцентное излучение), наконец, выявление дополнительного канала вторичных излучений – "зеркальной метки". Итогом такой разносторонней деятельности стала монография "Рентгенодифракциониая диагностика субмикронных слоев", написанная Р.М. Имамовым совместно с А.М. Афанасьевым и П.А. Александровым, которая издана в 1989 году.

Круг научных интересов Р.М. Имамова был широк и разнообразен. Совместно с академиком К.А. Валиевым разработаны многослойные апериодические по поверхности и глубине рентгеновские зеркала для оптики жесткого излучения, аппаратура контроля шероховатостей сверхгладких поверхностей и фазового контраста. В последние годы жизни Рафик Мамедович вместе с А.М. Афанасьевым и сотрудниками двух лабораторий развивали новые подходы к обработке рентгеновских экспериментальных данных. Эти исследования в корне изменили представление о важности того или иного метода диагностики. В результате хорошо известные более полувека двухкристальная рентгеновская дифрактометрия и рефлектометрия в комплексе образовали мощный метод диагностики наноструктур и нанокомпозитов.

Под руководством Р.М. Имамова выполнено множество дипломных работ, защищено 18 кандидатских и 4 докторских диссертации. Из многих городов России и зарубежных стран в его лабораторию приезжали на стажировку, для совместной работы, консультаций. За годы научной деятельности им опубликовано более 250 статей; он – соавтор 20 изобретений. Работы Р.М. Имамова признаны в нашей стране и за рубежом. За заслуги в научной деятельности ему в 2005 году присвоено почетное звание "Заслуженный деятель науки Российской Федерации".

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