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Light Sources for Materials and the AfLS context

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The discovery of new materials lies at the heart of future technologies, whether they are high energy density batteries for next generation electric cars, or locally sustainably manufacturable photovoltaics for off-grid African villages. Since materials derive their properties from the atomic arrangements, a starting point is characterize the structure and relate it to properties and processing. Modern materials of interest are highly complex, defective and nanostructured, but may have great properties. To solve the detailed structure of such materials we need powerful synchroton based x-ray sources, and novel data analysis methods which I will describe. Access to such facilities is foundational for materials science in the 21st century. I will discuss ways in which African scientists can begin to participate in this activity starting right away, and present a possible path forward towards greater independence and autonomy in the coming years, with the ultimate goal of an African synchrotron.

I will present an overview of the recently built NSLS-II synchrotron light source at Brookhaven National Laboratory, which will be the world's brightest synchrotron when it reaches full power, and the materials diffractometer, XPD, at that facility.

I will also discuss JUAMI, the Joint US-Africa Materials Institute, which is designed to bring together young African and US-based PhD researchers to learn together how to carry out research on materials, and to develop collaborative research activities. There will be a second JUAMI school in Arusha, Tanzania, in June 2016 focused on materials for sustainable energy. There is the possibility for an AfLS presence at that school.

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