



	<b>Experiment title:</b> Structural characterisation of novel magnetically doped photovoltaic organometallic perovskites	<b>Experiment number:</b> 01-02-1169
<b>Beamline:</b> CRG beamline BM01 SNBL	<b>Date of experiment:</b> from: 07.12.2017 to: 12.12.2017	<b>Date of report:</b> 20.02.2018
<b>Shifts: 9</b>	<b>Local contact(s):</b> Vadim Dyadkin	<i>Received at ESRF:</i>
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**Report:**

Using Cryostream 700+ nitrogen blower device, the XRD experiments ( $\lambda = 0.71075 \text{ \AA}$ ) were carried out with powder and single crystal samples at the 80 - 400 K temperature range.

The following diffraction data collections have been saved for our analysis.

- I. A newly prepared flake-like phase with the  $\text{EDPbI}_4 (\text{NH}_3\text{CH}_2\text{CH}_2\text{NH}_3)$  composition.
  - a. Single crystal data collections at  $T = 100, 110, 134$  and  $300 \text{ K}$ .
  - b. Powder diffraction data collection at  $100$  and  $300 \text{ K}$
- II.  $\text{MAPbI}_3$ . Study of cyclic phase transformations around the phase transitions temperatures.
  - a. Study around  $T = 330 \text{ K}$ , the tetragonal - cubic phase transition. 6000 powder XRD patterns were taken during five cycles of  $310 - 350 - 310 \text{ K}$ . Two samples were measured.
  - b. Study around  $T = 161 \text{ K}$ , the tetragonal - orthorhombic phase transition. 3402 powder XRD patterns were taken during five cycles of  $140 - 180 - 140 \text{ K}$  for one sample.
- III. Study of growth dynamics of  $\text{MAPbI}_3$ ,  $\text{MAPbBr}_3$ ,  $\text{MAPbCl}_3$  from three different past-like solutions.
  - a. Growth  $\text{MAPbI}_3$  from DMA at  $273 \text{ K}$ . 380 powder XRD patterns were taken.
  - b. Growth  $\text{MAPbI}_3$  from DMA with heating from  $273$  to  $313 \text{ K}$ . 69 powder XRD patterns were taken for each of two samples.
  - c. Growth  $\text{MAPbI}_3$  from DMF with and without heating. 999 powder XRD patterns were taken for each of two samples.

- d. Growth  $\text{MAPbI}_3$  from DMSO with and without heating. 999 powder XRD patterns were taken for each of two samples.
- e. Growth  $\text{MAPbBr}_3$  from DMA with and without heating. 201 powder XRD patterns were taken for each of two samples.
- f. Growth  $\text{MAPbBr}_3$  from DMF with and without heating. 55 powder XRD patterns were taken for each of two samples.
- g. Growth  $\text{MAPbBr}_3$  from DMSO with and without heating. 787 powder XRD patterns were taken for each of two samples.
- h. Growth  $\text{MAPbCl}_3$  from DMA with and without heating. 216 powder XRD patterns were taken for each of two samples.
- a. Growth  $\text{MAPbCl}_3$  from DMF with and without heating. 120 powder XRD patterns were taken for each of two samples.
- a. Growth  $\text{MAPbCl}_3$  from DMSO with and without heating. 93 powder XRD patterns were taken for each of two samples.

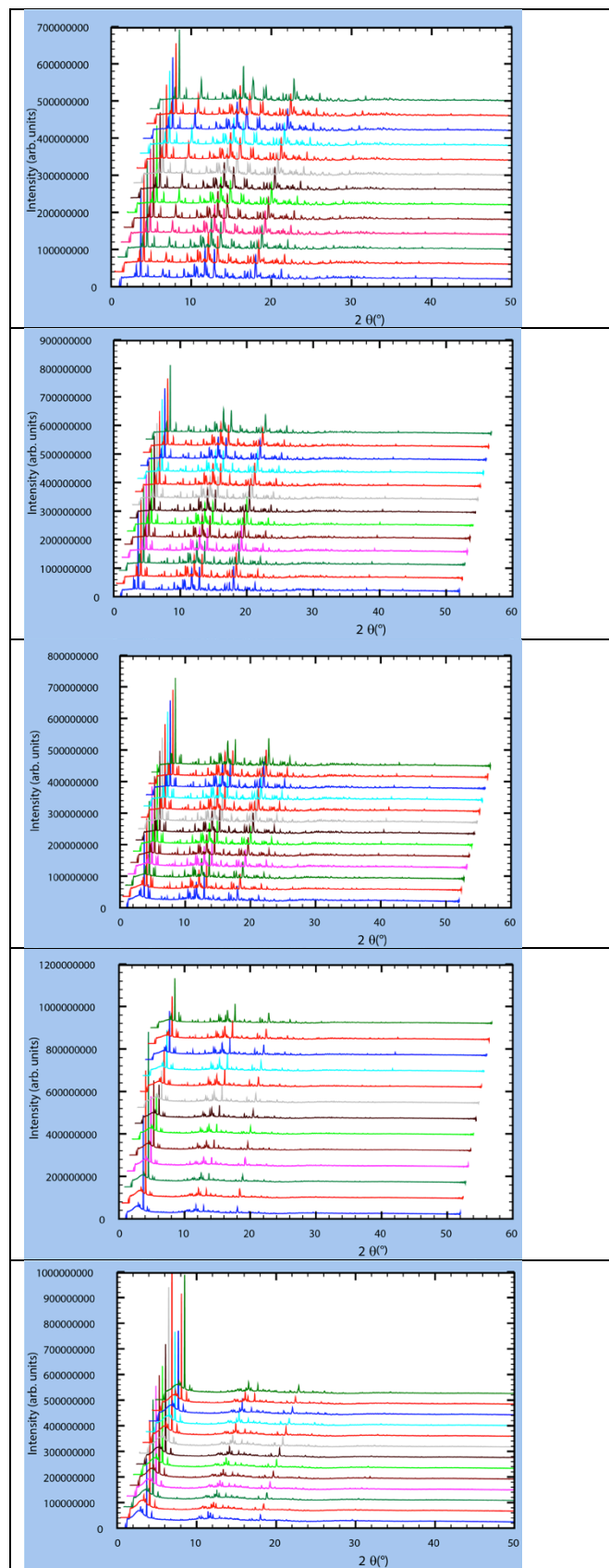


Fig.1. Growth dynamics of  $\text{MAPbI}_3$  from DMF.

**Analysis is in a progress.**