

# QIBA ADC Phantom Update

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semsdw b900 (0)

Image size: 256 x 256  
View size: 1145 x 647  
WL: 14946 W'W: 29888

8-PVP50  
Area: 1.044 cm2  
Mean: 26166.879 SDev: 2708.734 Sum: 4997874  
Min: 19578.000 Max: 30969.000

8-PVP30  
Area: 1.044 cm2  
Mean: 27215.555 SDev: 1017.256 Sum: 5198171  
Min: 24678.000 Max: 29313.000

8-PVP20  
Area: 1.044 cm2  
Mean: 19732.168 SDev: 524.626 Sum: 3749112  
Min: 18068.000 Max: 20934.000

8-PVP40  
Area: 1.044 cm2  
Mean: 30869.041 SDev: 675.303 Sum: 5988594  
Min: 29162.000 Max: 32478.000

7-Water  
Area: 1.044 cm2  
Mean: 6599.052 SDev: 267.568 Sum: 1273617  
Min: 5665.000 Max: 7329.000

7-PVP50  
Area: 1.044 cm2  
Mean: 33291.875 SDev: 836.060 Sum: 6392040  
Min: 31143.000 Max: 35382.000

7-PVP40  
Area: 1.044 cm2  
Mean: 28035.779 SDev: 425.093 Sum: 5354834  
Min: 27173.000 Max: 29361.000

7-PVP30  
Area: 1.044 cm2  
Mean: 26919.297 SDev: 604.658 Sum: 5249263  
Min: 24809.000 Max: 28297.000

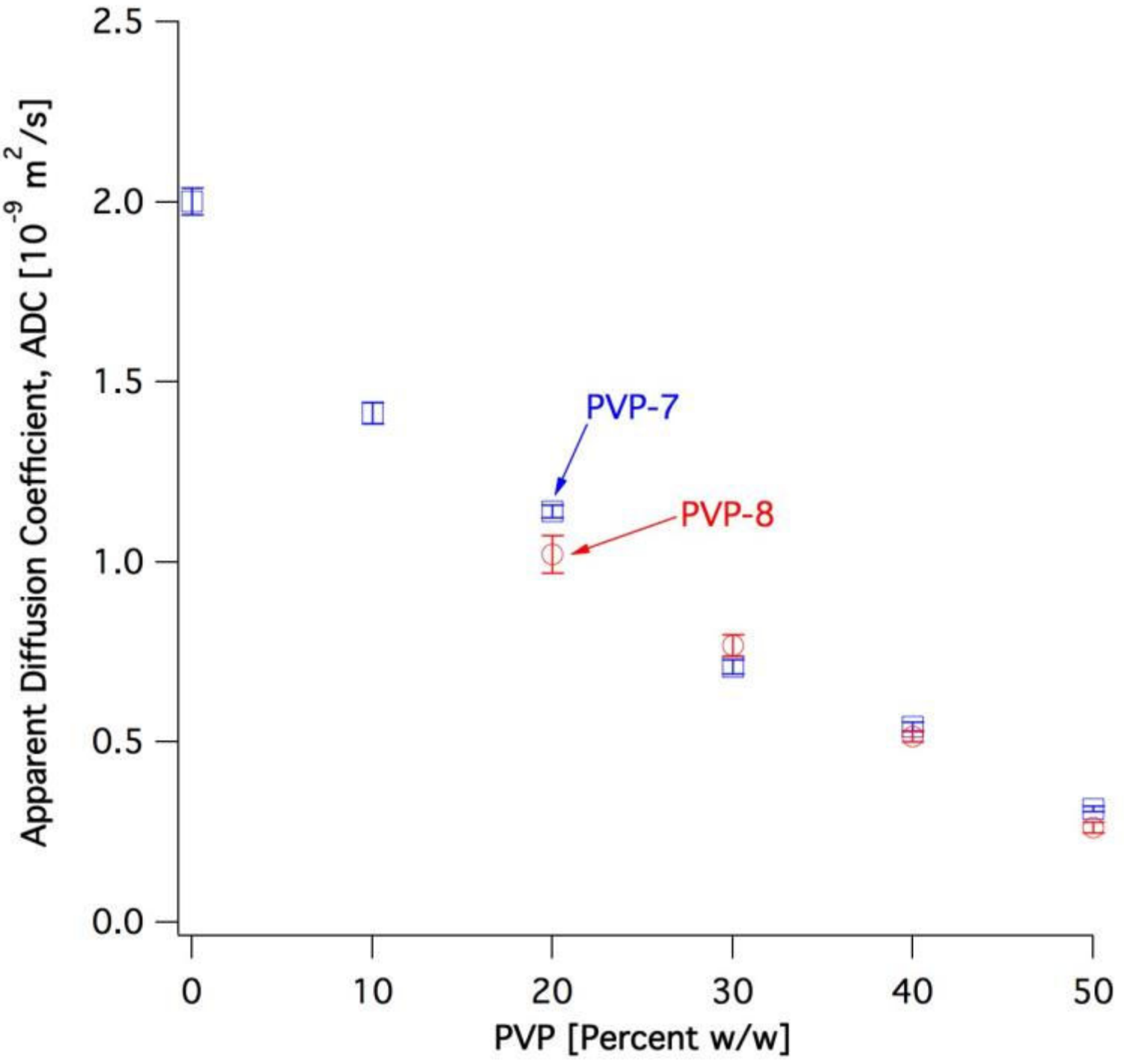
7-PVP20  
Area: 1.044 cm2  
Mean: 17639.268 SDev: 510.527 Sum: 3351461  
Min: 16558.000 Max: 18761.000

7-PVP10  
Area: 1.044 cm2  
Mean: 14042.290 SDev: 585.677 Sum: 2710162  
Min: 12908.000 Max: 15441.000

pvp78 b900 ( -, - )  
-- semsdw b900  
study\_2013062201  
0

Zoom: 265% Angle: 0  
In: 2/4  
Uncompressed  
Thickness: 10.00 mm Location: 19.43 mm

TE: 38.9 TR: 2000  
FS: 1.5  
6/22/13 6:12:20 PM  
Made In OsiriX



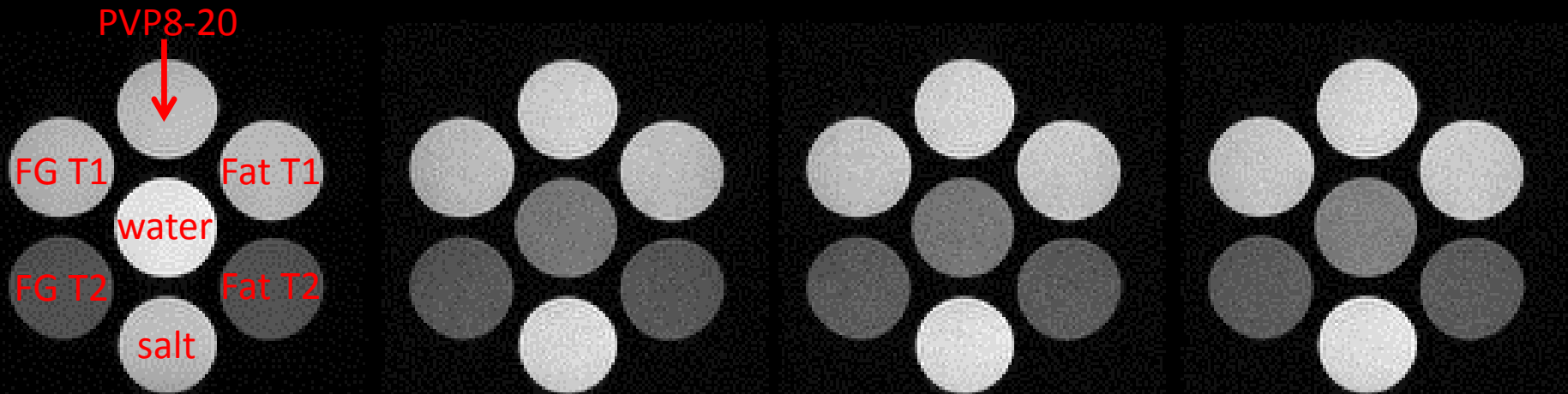
## Next steps in PVP development:

1. Automate DWI analysis routine
2. Dope PVP solutions to control T1 and T2
3. Adjust conductivity for optimal coil loading

# Doping PVP solution

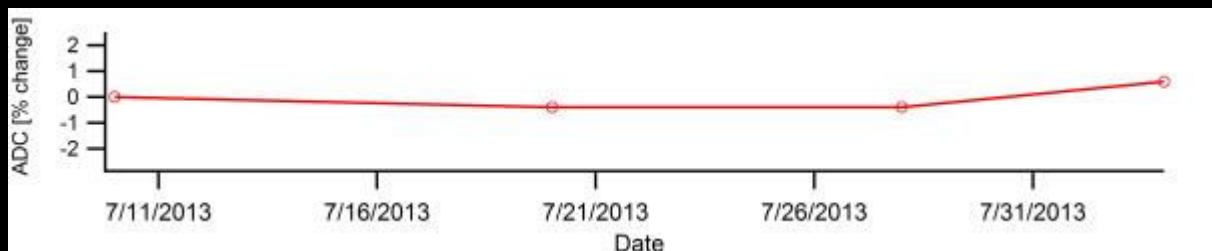
- PVP8-20 used as test bed ( $T_1 \sim 1.4$  s at 1.5 T)
- Ni used to adjust  $T_1$ , Mn to adjust  $T_2$
- Target  $T_1$ : 333 ms, 513 ms
- Target  $T_2$ : 53 ms, 58 ms
- Salt added to PVP8 at 150 mM concentration
- **Questions:**
  - **Will addition of Ni and Mn affect ADC?**
  - **Will Ni, Mn or NaCl lead to instability?**

# ADC Measurements



- Images acquired using SEMS-DW sequence,  $b_0$  and  $b_{900}$ , three orthogonal directions at 1.5 T, 16.5 °C
- DW images used to calculate ADC maps
- Mean ADC recorded in circular ROI of area 4 cm<sup>2</sup>

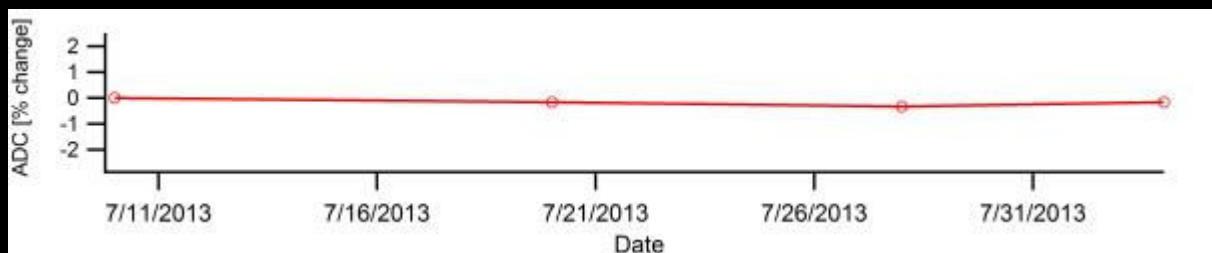
# PVP8-20, neat and with salt



PVP8-20, undoped  
ADC  $1.016 \times 10^{-3} \text{ mm}^2/\text{s}$



PVP8-20, 150 mM [NaCl]  
ADC  $0.971 \times 10^{-3} \text{ mm}^2/\text{s}$

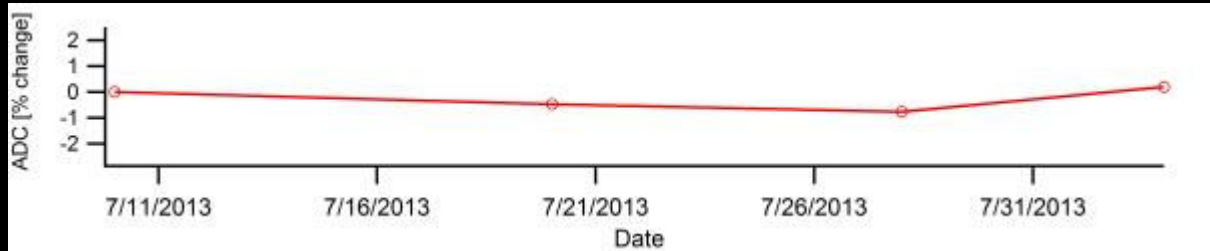


Water, 16.52 °C  
ADC  $1.843 \times 10^{-3} \text{ mm}^2/\text{s}$   
( $1.8417 \times 10^{-3} \text{ mm}^2/\text{s}$   
prediction by Holz *et al.*)

# Manganese and nickel-doped PVP



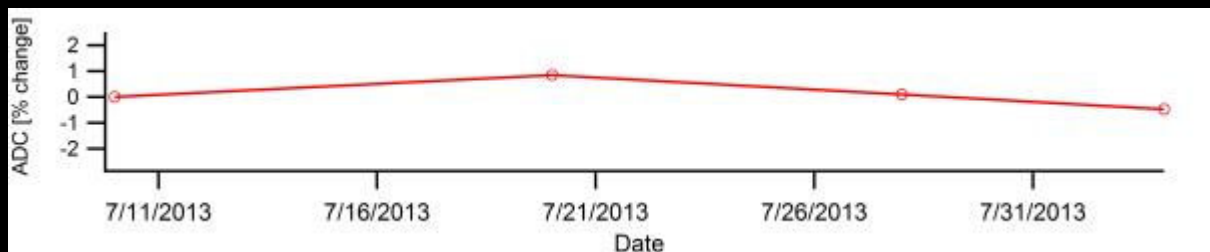
Fat  $T_1$  mimic, 3.5 mM [Ni]  
ADC  $1.086 \times 10^{-3} \text{ mm}^2/\text{s}$



Fat  $T_2$  mimic, 0.23 mM [Mn]  
ADC  $1.056 \times 10^{-3} \text{ mm}^2/\text{s}$



FG  $T_1$  mimic, 1.9 mM [Ni]  
ADC  $1.068 \times 10^{-3} \text{ mm}^2/\text{s}$



FG  $T_2$  mimic, 0.21 mM [Mn]  
ADC  $1.054 \times 10^{-3} \text{ mm}^2/\text{s}$



# Next Steps

- Continue monitoring long-term stability of PVP8-20
- Expand study to include high concentration, PVP8-50
- Incorporate mixtures of Mn and Ni for simultaneous control of  $T_1$  and  $T_2$
- Improve analysis workflow
- Questions, comments?